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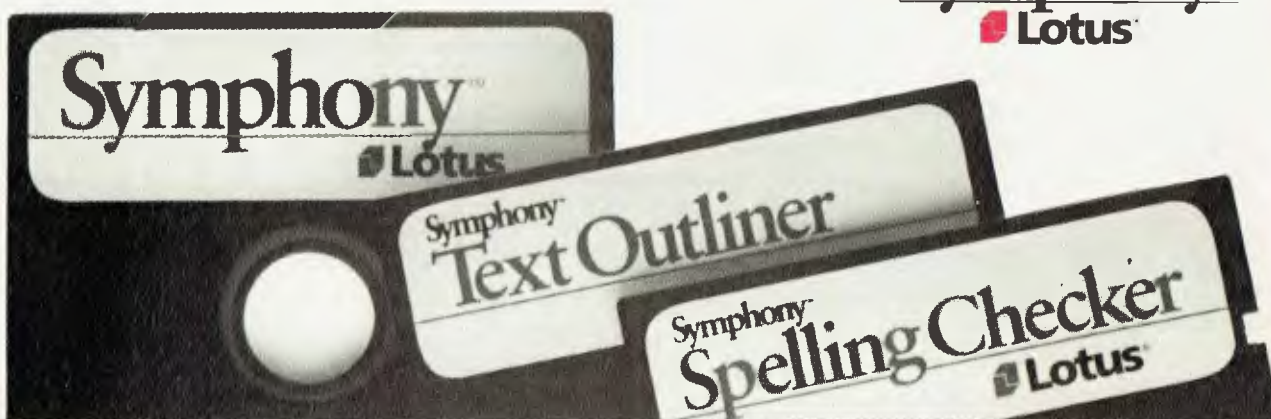
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## Changing the Rules of the Game

**W**e live in interesting times, as the saying goes.

Market watchers have long been aware of the influence of IBM as a rationalising force which sets standards in the PC market. By adopting Microsoft's MS-DOS operating system, IBM set the standard for software developers and, by weight of numbers, has set the standard machine architecture for manufacturers of other 16-bit desktop personal computers.

This is good and bad. It's good in that the existence of standards simplifies the user's task in selecting software, and it makes software widely available. It's bad in that developers of competing products cannot get them off the ground, no matter how technically superior they might be.

But at least we all know where we stand. Now that IBM has been in the PC market for four years, we all know the rules of the game.

But there are intriguing signs that the rules are about to change.

While IBM does plan to release a version 4.0 of PC-DOS, which will be MS-DOS version 4.0, there are reports that either at the same time or soon after IBM will release a proprietary operating system for the PC.

Now, at present IBM is constrained by anti-trust regulations to supply its software, manuals, spare parts and so on to third parties. Thus you can walk into an IBM dealer and buy a copy of DOS 3.1 to run on your compatible machine.

Recent reports indicate IBM has been having discussions with the United States

Justice Department, in an attempt to get around this ruling. If this succeeds, then, just possibly, the new operating system will be bundled with every PC and not otherwise available. This would have several effects.

First, since every PC will come with a 'free' operating system, and this will presumably still run existing PC-DOS software (if it doesn't it's almost certainly doomed to fail), then why buy PC-DOS? Secondly, if the new IBM DOS is not unbundled, then owners and manufacturers of compatibles will not be able to achieve compatibility with the new IBM standard.

Thirdly, with MS-DOS no longer the 'standard', it will be on equal footing with other operating systems. Perhaps Unix or Concurrent CP/M will emerge as the standard operating system for clones. From a marketing angle, we'll be back to the anarchic days of incompatibility between machines, and the user will have to be much more cautious in selecting hardware and software. On the other hand, technical advances will have a chance to flourish.

Most interesting of all, for the disinterested and dispassionate observers, will be whether IBM can succeed in an attempt to lock out all other manufacturers from compatibility. Traditionally, those mini-computer manufacturers who have attempted to 'lock in' their customers in this way have lost out in the long run. The question is: will consumers simply accept that IBM knows best, or will they stick with the style of PC they have come to accept — an open architecture?

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# What the Industrial Design Council thought about Labtam Computers



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## ANOTHER HIGH-BROW MACHINE FOR DICK SMITH

FOLLOWING ITS move upmarket to sell the Olivetti M24, Dick Smith Electronics has started marketing the Toshiba T1100, an IBM-compatible, lap-top computer (reviewed favourably elsewhere in this issue).

The Toshiba model was selected after an extensive investigation of lap computers by DSE, and will be sold bundled with Access IV, a personal productivity software package from the developer of Open Access.

DSE is expecting very healthy sales of the Toshiba T1100: General Manager of Computer Products, Steve Wilson, forecast sales of 300 units per month. "The T1100 is the only real lap-top with IBM compatibility and the functionality of a desktop computer at an affordable price that we have found during extensive investigations," commented Mr Wilson.

Retail price of the T1100 with Access IV will be \$2995. The computer is built around the 80C88 — a low power consumption CMOS (complementary metal oxide semiconductor) chip. With an integrated 9 cm 720 Kbyte floppy disk drive, there is plenty of room for data, but the optional 13 cm external floppy will be needed to read IBM disks directly.

The machine comes with 256 Kbytes of RAM and will run for eight hours under rechargeable battery power. An AC adaptor is also available. The batteries make up a fairly large proportion of the unit's 4.1 kg.

This is the first release worldwide of Access IV. The package is built around Open Access's graphics and spreadsheet programs, with integrated time-zone calculator, diary, notepad, business card directory and calculator. Many of the functions sit in RAM and 'pop up' when required.

With so much happening at the high end of the market for Dick Smith Electronics, what's happening in its traditional low-cost arena? According to Steve Wilson, the company is aiming to market a complete range of computers, from the mass-selling VZ300 to the Olivetti M24 at the top.

The Challenger is due to be replaced soon by a second version, with a lower price. Plans are also afoot for a 'Dick Smith alternative' to the Toshiba lap-top. The main members of the DSE computer family will thus be the VZ, the Toshiba T1100 and a cheaper alternative, the Bondwell CP/M portable, and the Olivetti M24 with the new Challenger as its cheaper alternative.

The designation of a separate area, called Computer Stop, in each Dick Smith retail store, is evidence of the increasing contribution of business computer systems to the company's total business. Sales of business computers have totalled about 4000 units in the last 12 months, with the Olivetti accounting for approximately eight per cent of the value of computer sales in that period.

### Supporting the Family

To consolidate its successful entrance into the business computer field, DSE has set up both support and training departments.

Marketing support for Dick Smith retail outlets, as well as telephone hotline support and answering written enquiries, is handled by the support department.

The training department employs a full-time trainer responsible for instructing retail sales staff. The company has also established affiliations with independent organisations for end-user training.

The Toshiba T1100 will be marketed through DSE's 56 stores in Australia and 10 stores in New Zealand. The lap-top computer is expected to further the company's expansion into the computer mar-



ket, which now accounts for about 30 per cent of its present \$60 million a year turnover.

Hardware support for the T1100 will remain in the hands of Toshiba. Toshiba's plan in marketing the T1100 through DSE was to include a network of retail outlets to balance the existing network of Toshiba computer dealers. Max Fredericks of Toshiba said: "Dick Smith Electronics was selected by Toshiba as it offers the best network of business computer retail outlets through the Computer Stop sections of its stores." □

### LASER DAZE

We know our readers don't need to read fashion magazines. After all, they're already reading YC, and that's very fashionable!

All the same, stray over to the fashion mags next time you visit the newsagent and have a look at *Follow Me*. The current issue features a hologram on the cover, the first of its kind to appear on any magazine in the world. The 3D image is of Kelly Emborg, an American model who just happens to be Rod Stewart's girlfriend (well, she was at the time of going to press).

What, you may ask, does all this have to do with computers? Lots — the shooting of the hologram was performed by a video camera mounted on a fixed track. The camera contains a computer which controlled not only the ex-

posures (some 270 frames onto a special computer-graphics sensitive film), but the movement of the camera in an arc along the track around the stationary model. The result is the first reflective embossed hologram that moves — and the first where the camera moved to create the image rather than the object.

It seems a new art form — techno art — is emerging, a product of the advances in laser and video technology over the past decade. Computers are an integral part of this new industry and holography is just one of the by-products.

Dr Steve McGrew, who created the hologram for *Follow Me*, says the time will come when reasonably priced, high-quality holograms will compete with conventional colour printing processes. *Follow Me* had to fork out \$200,000 for its limited-edition hologram cover. □



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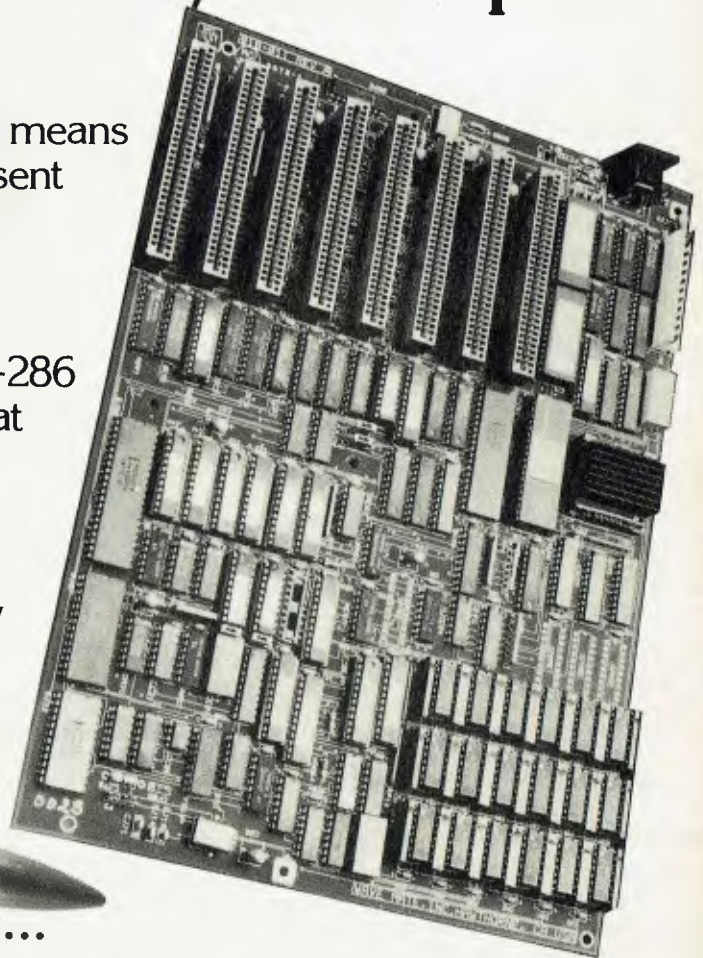
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## APCON '85

APCON '85 is a convention which is unique in concept. Organised by Sydney's PC User's Group, it will be held on the 3rd and 4th of September at the Masonic Centre, 279 Castlereagh Street, Sydney.

The convention marks the first anniversary of the PC User's Group, which held its first public meeting in September 1984. The initial experience gained by the committee of the group quickly revealed that the average user needed assistance in working out how to apply off-the-shelf software to solve particular problems. The need for an event like APCON '85 was obvious.

In case you hadn't worked it out, APCON is an applications convention. It is being organised by computer users for the benefit of other computer users. The presentation format is simple; various computer experts will address the participants on a spe-

cific topic, and each address will be followed by a practical demonstration session, during which up to 30 presenters will show how they tackled the problem of customising applications software to solve their own needs.

### Topics and Speakers

Six topics will be covered during the convention: spreadsheets, PC languages and graphics are scheduled for the Tuesday; and on the second day databases and word processing will be discussed, with the final and most interesting topic, 'The Future', closing the convention proceedings.

A number of well-known speakers have been invited to address participants. They are:

**Bill Machrone** — editor of PC, the leading (fortnightly) magazine on personal computers in the United States.

**Ron Sayre** — manager of PC programs for IBM, Japan.

**Les Bell** — renowned for his knowledge of computer languages and databases, Les is con-

tributing editor to *Your Computer* magazine.

**Bill Lohse** — was recently the keynote speaker at the PC World Forum, in France. Bill also accepted an invitation from the President of France to advise French software producers on marketing their products.

**Mark Snedden** — a specialist in computer graphics, Mark is President of the Queensland Computer Graphics Society. In 1984 he was named Australian Computer Society Speaker of the Year.

A speaker on spreadsheets is expected to be provided by Arcom Pacific.

### Support

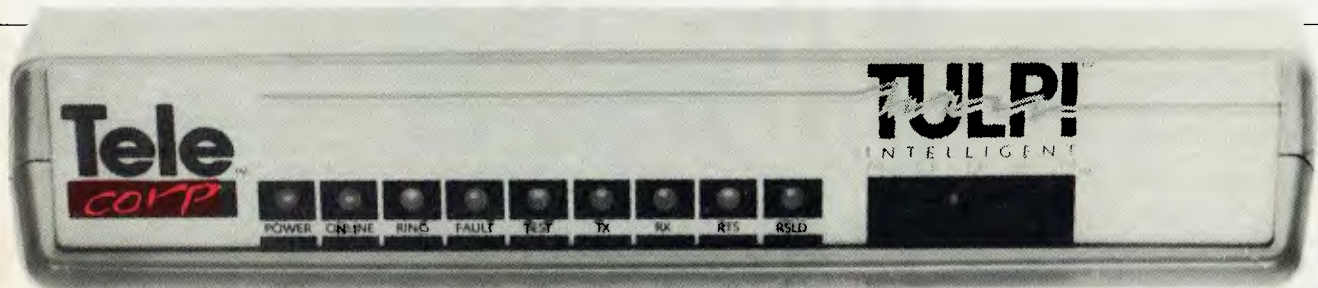
Support for APCON 85 has come from a number of varied professional and business enterprises. Early sponsors included IBM, Microsoft, Imagineering, TNT Group 4, *Business Review Weekly*, Rank Electronics, Arcom Pacific, Nelson Wheeler O'Brien, PC Extras, Ron Pollak and Co and Continental Airlines.

These enterprises have provided the support necessary in the early stages of organisation to encourage the PC User's Group to develop the APCON concept.

Support from other business enterprises has come in the form of payment for their senior personnel to attend the convention. Amongst these are the Commonwealth Bank of Australia, Brambles, the Sydney Water Board, the NRMA, Caltex, Sun Alliance, Nelson Wheeler, Hyster Australia, Sourceware and Dimension Graphics.

### The Future

Virtually every speaker asked to participate in the Convention indicated a preference to talk on 'The Future' of computing — and they will get the opportunity to do so. After the keynote speaker has delivered his address on this topic, all convention speakers will be asked to participate in 'Forum of the Future'. This is expected to be an exciting session and the speakers are preparing to be



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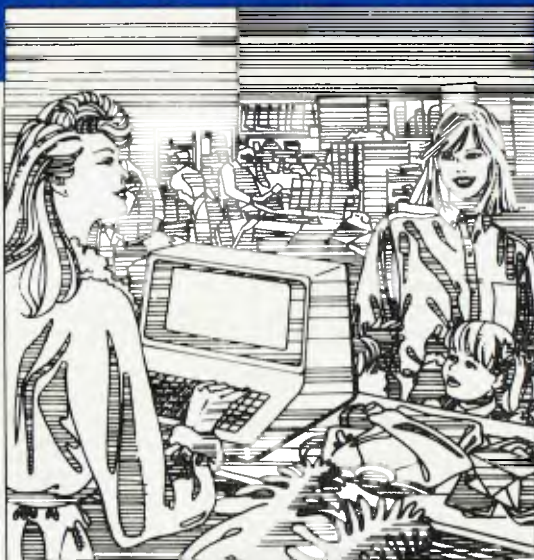
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bombarded with questions, sticky or otherwise, which they will undoubtedly field with interesting answers.

## Attendance

Attendance at APCON '85 has been limited to 300 participants, and a sellout is anticipated. For more information, ring Sheila Philipppsohn on (02) 663 3919 (or Ana Caligeros on (02) 290 3655).

The First Pan Pacific Computer Conference will be held from September 10-13 at the Royal Exhibition Building, Melbourne. It will incorporate the Australian Computer Conference organised by the Australian Computer Society.

The theme of the conference is 'Software the Driver', indicating the importance of software in determining the direction of development of hardware and the industry as a whole.

Conference speakers will include George Conrades, Vice President, Asia Pacific Group, IBM; Robert Miller, Senior Vice President, Data General Corporation; Dr Kazuhiro Fuchi, Director, ICOT; and Robert Ragan-Kelley, Vice President of Pyramid.

A series of professional development seminars and site visits will be offered at no additional fee, and state-of-the-art products will be on display at the exhibition.

For more information on the  
conference phone (03) 598 3675,  
and on the exhibition (03) 429  
6088. ☐

Users of low-speed computer terminals now have easier access to Telecom's packet switching network, Austpac.

Telecom's data manager, Mr Andrew Lockwood, said customers with data terminals operating at 300 bits per second can now access Auspac through the switched telephone network without having to enter a speed selection sequence, simply by dialling 01921.

"We've made the change be-

cause we've had reports of minor difficulties and irritations associated with the need for speed selection," said Mr Lockwood. "We also know from recent surveys that very few terminals operate at data speeds below 300 bits per second."

Terminals operating at 300 bits per second will now be able to call 01921 and, on switching to the data mode after the Austpac auto-answer tone, immediately receive the Austpac banner indicating communication has been established to the packet assembler/disassembler. Austpac will continue to cater for the small number of users of data terminals operating at speeds of 110, 150 or 200 bits per second.

Information on the Austpac service can be obtained from the recorded information service on (03) 67 2388. ☐

Citicorp Capital Investors has taken a 10.75 per cent interest in Applied Technology, manufacturer of the Microbee. The capital injection of \$500,000 is the first outside funding for Applied Tech and will assist the company's international expansion and product development.

The managing director of Citicorp Capital Markets, Mr Ian Lansdown, said the investment in Microbee was important for Citicorp: "It is a company with a good product, an entrepreneurial and energetic leader and a strong marketing thrust. Citicorp has been impressed by Microbee's track record and its plans for the future, and has been talking with the company for some time to ensure that its capital needs for its next phase of expansion can be met. We can also give group support in the global marketplace through the Citibank network."

Since the Microbee was first produced in mid 1982, more than 50,000 computers have been made and sold from the Gosford, New South Wales, plant, where production capacity is now 3000 computers a month. □



## RANK XEROX RAISES ITS PROFILE

Mention mice, windows and menus and most people will think of Apple's Lisa and Macintosh. This must rankle with Rank Xerox, as the concepts all came from the company's famed Palo Alto Research Centre. Trouble was, Rank Xerox managed to keep these great concepts well away from the mass market and it took a company such as Apple to bring them to the people.

Now, Rank Xerox has decided to raise its profile and claim its own. It maybe a little too late to change the public perception of mouse ownership, but it's certainly in time for the release of a new range of artificial intelligence products.

Taking centre stage is the 8014 A-Star, described as "the first commercial release by any major

corporation in Australia of a total system to handle artificial intelligence applications". The A-Star is targeted mainly at government departments such as the State and Federal Police, Defence, Foreign Affairs and the intelligence community.

Hardware on the system consists of 1.5 to 3.5 Mbytes of main memory, 8 Mbytes of virtual

memory, 42 Mbyte hard disk storage, a 10 MHz Ethernet controller, a mouse and a large display unit. Software includes high-performance engineering tools, interactive graphics, display editor and inspector, raster scan graphics and communications software.

Rank Xerox is committed to supporting the system with over-



seas and locally developed software. The United States parent company's Vista Laboratory is devoting a lot of energy to the development of AI software, and the director of the laboratory, Peter Fisher, was in Australia for the launch of the A-Star. Initial software for the system will consist of the Xerox in-house languages Interlisp-D and Smalltalk-80. □

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## AMERICAN GRAFFITI

BY HOWARD KARTEN

ARTIFICIAL  
INTELLIGENCE  
IN THE  
MARKETPLACE

Microcomputer-based artificial intelligence is rapidly becoming a very practical tool. At the moment, however, its primary usefulness on microcomputers appears to be focused on extracting money from customers and investors. More practical applications may still be some way off, according to spokespeople at several leading United States companies.

For three decades researchers have dreamt of encapsulating human expertise in the computer, of endowing cold hardware with seemingly human abilities. (The dreams of scientists and en-

gineers, not surprisingly, have often seemed to be nightmares for those of the poetic, artistic, and sometimes theological persuasion.) And, indeed, several AI projects are now realities, earning their keep daily on mainframes in geology (Prospector), medicine (PUFF, CADEUCUS), repair of diesel engines, and other fields.

Of course, some applications are a little less useful: at a meeting of the American Association for Artificial Intelligence not too long ago, we heard an earnest graduate student (studying under one of the most eminent names in American artificial intelligence) describe his project, which had something to do with getting a computer to produce new Chinese dishes. Somehow, I have always believed that no matter how smart computers get, some things are best left to human ex-

perts, such as Chinese chefs.

Naturally, it was only a matter of time before entrepreneurs and other visionaries, heeding the seductive call of microcomputer-based artificial intelligence, set out to make the tool available to the masses via micros.

Around a dozen United States firms are currently selling microcomputer-based AI tools. Most are shells. That is, they are general-purpose products — instructions only — for which users must enter the specific knowledge, rules, and expertise of their individual fields (see 'Swinkels Sells System Shells' later in this issue). The formal name for the shells is 'inference engines', and the specifics of the user's situation — whether details of decision-making in finance, medicine, geology, whatever — is referred to as 'the knowledge base'. The inference engine processes the knowledge base — *any* knowledge base.

An informal survey we did recently showed that total sales by leading United States vendors probably number under 3000 copies. That's surprising, given the excitement generated in the media, the size of the American market and the number of potential applications even within one good-sized company.

"There are probably no more than 50 to 100 AI applications currently earning their keep," estimates Ray Weinstock of California Intelligence in San Francisco. Adds Dustin Huntington, president of Exsys Inc of Albuquerque, New Mexico, "There's an awful lot of hype around. People sometimes include natural language interfaces in the category of Artificial Intelligence, and some companies have made a lot of money by projecting AI as magic".

There may already be some true AI applications in mundane, day-to-day use. No one would be surprised if users/developers of successful AI-based models for, say, choosing securities, kept quiet about the existence of their product: they fear they may somehow risk diluting the profits derived from using the tool by

selling the actual tool outright.

Indeed, the financial field will probably be one of the first true application areas of microcomputer-based AI, aided significantly by the facts that finance is already largely digital (interest rates, borrowings and so on) and the answers are usually much simpler — shall I invest or not, shall I buy stock X, and so on.

Another problem, of course, is how does one distinguish between 'any old application' and a true AI application? Yesterday's 'gee-whiz' invention quickly becomes tomorrow's *passé* subject. Perhaps someone will come up with an artificially intelligent program which can distinguish among artificial intelligence, natural stupidity, and hype.

OPTICAL DISKS  
ON OFFER

There are strong signs that the coming year will be the Year of the Optical Disk. More and more companies are bringing out optical disks of various sorts, and several have products which work with, or can be slipped inside, an IBM PC. Optical disks of varying forms were exhibited at this year's National Computer Conference held in Chicago, Illinois in mid-July. Two recently announced optical disk capabilities for the PC offer different approaches.

Information Storage Inc (Colorado Springs, Colorado) sells a \$US2495 optical disk drive that can hold 100 Mbytes. The system, which allows users to write as well as read the disks, uses optical disk cartridges selling for \$125 (though they may get as low as \$60 in large quantities). However, there seem thus far to be two significant problems, which most users will find objectionable: first, ISI is currently the only source for the media; and second, no agreed-upon standard for optical disks has yet emerged. Thus, there is a possibility users will become dependent on the vendor, and offerings of other

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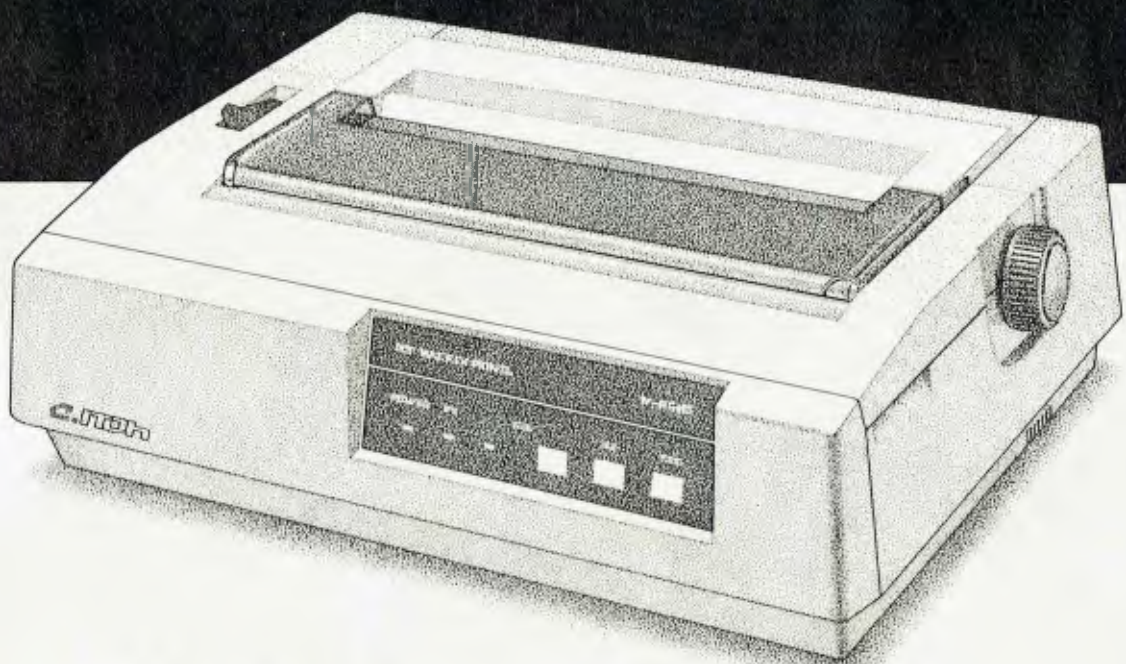
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vendors will not be compatible.

Coincidentally, not far from ISI in Boulder, Colorado, Reference Technology Inc recently began selling a product it calls the Claxix CD-ROM. The Series 500 Claxix product is a 12 cm optical disk — the same type of media on which prerecorded television programs are sold to home consumers. However, data is recorded on the disk in purely digital form.

The Reference Technology product has its own drawbacks. First of all, this system is oriented towards distribution of large volumes of material to field locations — for example, distributing complete books, catalogues, databases, bulky maintenance

manuals, and so on.

Second, the vendor is selling this product primarily as a service in which it creates the original file or master from the customer's data for a fee, and then sells the individually created disks to the user for as little as \$15 each. Field users of the disks, such as local offices of a company or consumers, can't update the disks or files they receive. And, although the disks themselves use a standard called the Sony/Philips standard (after the two originating vendors), that standard is a de facto one, which has apparently not been formally adopted by many organisations such as ANSI (the American National Standards Institute). □



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(From May-Your Computer)

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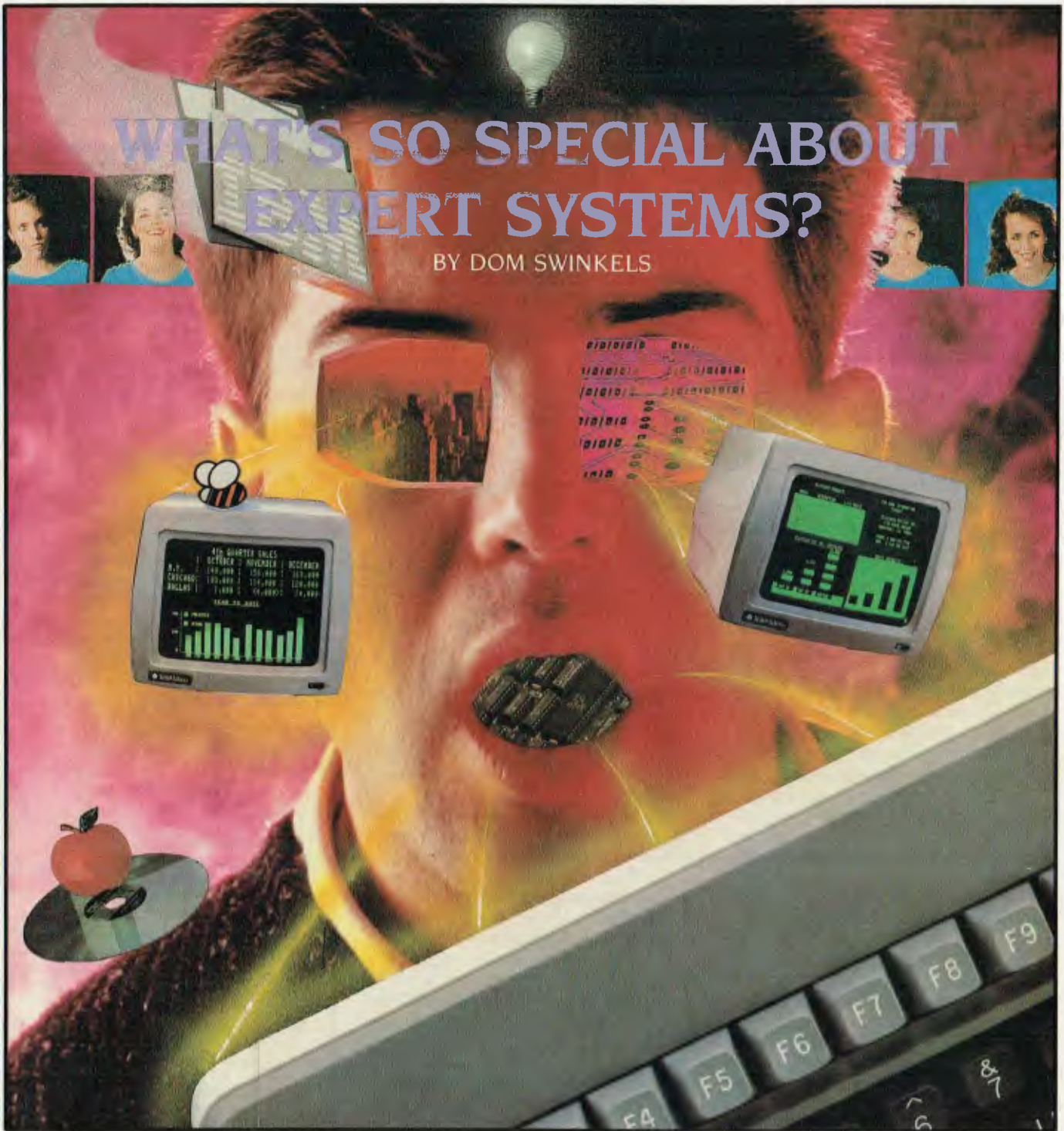
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Possibly the most exciting development occurring in computer applications is using machines to capture and subsequently use the knowledge of experts. The programs which allow us to do this are known as expert systems, a practical development of the research into artificial intelligence (AI). In this article Dom Swinkels explores what expert systems are, why there is so much interest in them and what the latest developments are in the field.





## LATEST DEVELOPMENTS IN THE FIELD

**A**n expert system is a computer program which simulates a human expert — which immediately begs the question: "What is a human expert?" An expert is clearly someone who has more knowledge in a particular subject area than those around him or her. Two things are important here: expertise is relative to other people in comparison with the expert, and the expertise may be limited to a particular subject or area of knowledge — or, as they like to say in artificial intelligence, to a particular domain. Thus an expert in tuning Formula-1 racing cars will be useless at diagnosing your medical problems, and vice versa.

Expertise is relative. For example, when a child suffers a minor burn a parent is likely to have the expertise necessary to treat it to minimise pain and prevent infection. If the burn is more severe a family doctor may be consulted as being more expert in these matters, and he or she in turn may decide in severe cases to send the child to a specialist; these are the relative levels of expertise in this domain.

Human experts have several other characteristics which our simulated expert should also have. For one thing, experts will continue to learn and increase their knowledge. They do this not just by gathering more facts, but by developing rules from their experience, rules which they can use in the future to solve new problems.

When we consult experts they can generally explain how they arrive at a given conclusion or why they ask a particular question during the consultation. Experts typically solve problems that are unstructured and ill-defined, usually in situations involving some sort of diagnosis or planning of future action. So, if our expert system is to simulate the human expert well it must be able to 'advise, analyse, categorise, communicate, consult, design, diagnose, explain, explore, forecast, form concepts, identify, interpret, justify, learn, manage, monitor, plan, present, retrieve, schedule, test and tutor' — to mention just a few of the activities we might expect from an expert.

Another description of an expert system defines it as 'a computing system embodying organised knowledge about some area of human expertise which enables it to

perform as a skilful and cost-effective consultant'. The important thing to remember is that expert systems are simply a class of software. Other classes of software might be word processors, databases, spreadsheets and so on.

Like all areas of technology, the development of expert systems has led to an associated language to describe the concepts commonly used, and we will not be able to discuss expert systems without first learning some of the language that has grown with this branch of computer science.

### Some Definitions

Since expert systems are a practical application of ideas from artificial intelligence, we should start there. AI is the branch of computer science which studies methods of making computers behave in ways we would recognise as 'intelligent' in other human beings. We can no longer think of computers just as machines for doing computations or for manipulating data. We must broaden our view and allow for the possibility of computers using knowledge.

We can define a database as a collection of data (facts) about objects and events. A relational database is one in which a number of fixed relationships between these objects and events are stored explicitly for flexibility of storage and retrieval. A knowledge base goes further and stores facts, assumptions, beliefs and other relationships of various degrees of certainty about these facts and their interrelations.

Figure 1 attempts to show this hierarchy from what we traditionally regard as machine functions (storage of data) to what are considered to be human characteristics (rules of thumb and uncertain relationships). These 'uncertain relationships' are called *heuristics* — experiential, judgmental knowledge. They are the knowledge underlying expertise, the rules of thumb or rules of good guessing, born of experience, that usually achieve the desired result but do not guarantee success. Knowledge-based systems are the computer systems which create and use such knowledge bases, and although the terms 'knowledge-based system' and 'expert system' are often used

interchangeably, I would define the concept of knowledge-based systems as the broader base, of which expert systems are the main example.

It requires a different approach from normal programming, plus special knowledge, to develop expert systems; the art of designing and building these systems and other knowledge-based programs is known as knowledge engineering, and a person skilled in this art is a knowledge engineer.

Taking this analogy still further, the part of an expert system which does the reasoning, using the knowledge in the knowledge base together with the facts provided by the user during the consultation, is known as the *inference engine*. This leads us to the three main parts of any expert system: the knowledge base, the inference engine and the human interface, which allows us to interact with the other two subsystems. This relationship is shown in Figure 2, which describes the basic structure of an expert system.

The coding of an expert system is quite simple in principle. It consists typically of a set of IF... THEN rules, which are executed repeatedly. Expanding this a little we have:

Figure 1. Hierarchy of 'knowledge'.

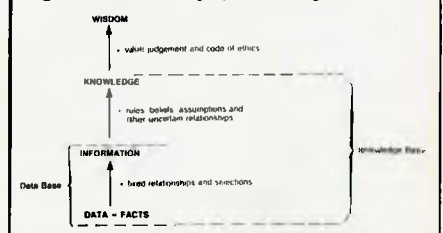
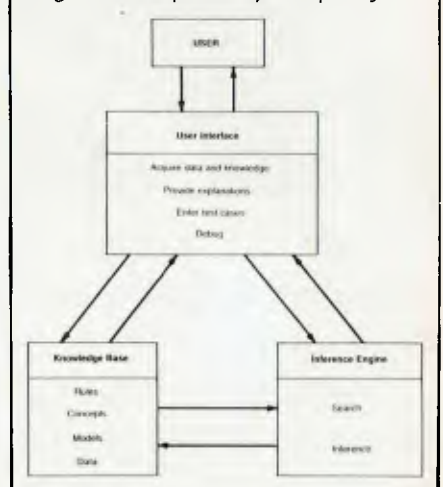


Figure 2. Components of an expert system.





# Expert Systems

IF <premise> THEN <conclusion>

We can run through such a set of rules in two ways, one called forward chaining and the other backward chaining. In forward chaining we start with a fact and find the rule whose premise is verified by the fact. The conclusion of the rule is then added as a fact to the working memory, and in turn may fire another rule and lead to another conclusion.

The backward chaining approach starts with the conclusion we seek to prove; in other words, it starts with a hypothesis. In backward chaining we find a rule whose premise supports the hypothesis and then try to verify the premise by searching for the relevant facts. If no supporting fact is found, the system searches for a rule that can be used to infer that fact. This process continues until the original hypothesis is verified or disproved.

Now, armed with these definitions, let's see what all the fuss is about. Why is there such an interest in knowledge engineering, and expert systems in particular?

## Commercial Applications of Expert Systems

There's nothing like some good commercial profit, or the prospect of such a profit, to create interest, and this explains why expert systems sat around the universities for a decade or more without being extensively developed, but have suddenly become a high-profile topic in computer science in the last few years. Industry is starting to realise there are many potentially very profitable things to be done with computers using the methods and ideas of AI researchers applied to knowledge-based systems.

Many of these applications are of course kept fairly quiet. After all, if you have a commercial advantage over your competitors you'd be better to keep quiet about it rather than shout it from the rooftops, in order to maintain that advantage as long as possible. Nevertheless, a few examples are well known: for example, Digital Equipment Corp uses an expert system now known as XCON to configure VAX computers.

A VAX is not like an Apple or an IBM PC, where you have a single basic system into which you can plug half a dozen special-purpose cards. In the case of a VAX, a much wider range of options is available, and the machine meeting your particular specifications is configured on paper at the factory and then built to meet your requirements. Specially trained and expert staff do this

*There's nothing like some good commercial profit, or the prospect of such a profit, to create interest, and this explains why expert systems sat around the universities for a decade or more without being extensively developed, but have suddenly become a high-profile topic in computer science.*



job, and the cost of errors discovered during manufacture is obviously high. Some 20,000 VAX computers have now been configured with the aid of XCON, and although the same number of human staff is still employed in this job, the number of systems configured has gone up a great deal, so that the cost per computer has obviously gone down. At the same time errors in delivered systems have gone down from 35 per cent to 2 per cent.

Another example comes from the inspection and testing of printed circuit boards. A saving of over \$1 million per year is claimed to be achieved by using an expert system in this task. The expert system,

like all computer-based systems, doesn't get tired; it has no off days, and if well designed should be as good as or even better than its best human equivalent.

An early expert system known as Prospector simulates the expertise of a geologist, and was used to locate a mineral deposit containing \$100 million worth of molybdenum.

Westinghouse has a plant recovering enriched uranium whose operation was improved and recovery increased from about 70 per cent to 90 per cent through the use of an expert-system-generating package known as Expert-Ease, along with other traditional means of analysis. This increased the throughput of the plant by more than ten million dollars per annum.

## Simulating the Human Factor

Large commercial operations, which are complex and often not understood sufficiently well at the fundamental level, may not be able to be computer-controlled effectively except by simulating the human operator control; that is, by taking the expert system approach. This often means control based on learning from experience.

For example, a cement kiln is a cylindrical chamber up to 100 metres long in which limestone and clay are heated to around 1000 degrees Centigrade, at which point they react to make cement. Only half a dozen measurements can be made to determine the state of affairs inside the kiln, but experienced operators have learned how to fine-tune the operation using only this limited information.

A complete mathematical model of what goes on inside the kiln would be very complicated, and is not the way the operators control it. Rather, the operators have learned to recognise associations between desirable outcomes (production and quality) and the vague and, in computer terms, 'fuzzy' criteria such as fast, medium or slow rotation of the kiln, high lime content, low exhaust gas temperature, and so on. The expert system approach has allowed such fuzzy logic to be programmed, and computer control systems based on such an expert system now control a number of kilns. One cement company, which changed from manual control to 'fuzzy logic' control simulating the human expert operator, was able to reduce fuel consumption by 4 per cent, increase kiln refractory life by 50 per cent and improve cement strength by 10-15 per cent.

Foxboro, the well-known supplier of



# Expert Systems

control equipment, recently announced its new EXACT (Expert Adaptive Controller Tuning) method of control. It is designed to control a single process loop using a standard PID controller to run the whole process. The expert part comes in setting the controller parameters to control the process with minimum lag or overshoot. It is this tuning of the controller to the process, normally performed by the expert control engineer, which is performed automatically by the self-tuning software. This replaces the human expert but differs significantly in method and approach from the systems discussed above.

However, even for an apparently simple situation such as pH (acidity) control, this approach has been found to have significant benefits. One company is claimed to have saved nearly \$400,000 in a year on a pH system by changing to Exact control.

The applications of expert systems are certainly not limited to process control applications, although these are the applications in which the dollar benefits are usually more easily established. Early research into expert systems, on the other hand, concentrated a great deal on medical diagnosis, where the benefits are in terms of improved diagnosis and reduced cost and suffering to the patient. (See, among others, the May 1984 issue of *Your Computer* for a discussion of medical applications of expert systems.)

Diagnosis of equipment faults is another large and fruitful area, including computer equipment, engines and plant of all kinds. Major expert systems have also been written to determine the structure of chemical compounds (Dendral) or to analyse information from oil well drilling logs (Dipmeter Adviser and Drilling Adviser), to aid in mathematical analysis (Mac-syma) and air traffic control (Airplan).

The use and interpretation of complex systems of rules and regulations such as building codes and tax laws (Taxman) are also fruitful applications for expert systems. The most suitable areas are where complex decision-making is required and large amounts of money are involved, so that even a modest improvement in the quality of the decisions can give a significant return.

Any area where top-rate expertise is rare and hence expensive is potentially a good application, and we can expect in a few years that this exclusivity will filter down to such a level that we will be able to buy such packages as expert tax advice or gardening, or any of a number of 'adviser' packages.

*There are many critics of expert systems, and they tend to be in powerful positions. They are the experts, who through many years of study and patient practice have become so expert, and now enjoy some well-deserved returns in terms of respect and well-paying positions.*



THE FEIGENBAUM  
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## Current Status

If expert systems show so much promise, why are there not expert systems all around us? Why is knowledge engineering a technology which is only just starting to move out of the research laboratories and into use?

First, timing. I believe knowledge engineering will indeed see some rapid growth in the next few years. We're just starting to see the combination of circumstances where the fundamental understanding has reached a sufficient level to allow fairly rapid — and profitable — building on the foundations laid.

A number of expert systems developed from scratch have led to expert system structures which can be used for other expert systems of a similar type. Such programs, which are basic systems without the specific knowledge for which they were originally developed, are known as expert system shells. Since the possibility of having an expert system shell without the knowledge base was realised, such shells have

been developed for several types of knowledge representations and for many computers, particularly micros. They may be compared to spreadsheets in that they provide a structure and a set of tools designed to make the job of writing and using an expert system a lot easier.

Such expert system shells and tools range from Expert-Ease, mentioned earlier and available for \$1200 from Systom (169 Unley Road, Unley 5061), to Personal Consultant (Texas Instruments, \$US3000) and Exsys (Exsys Inc, \$US295) to the \$US95 package called Insight, which is claimed to interface to dBase II. All of these run on an IBM PC or similar machines. The market for such expert system tools and shells was \$20 million last year, and is expected to grow to \$200 million in two years and possibly to \$1 billion by the end of the decade. Table 1 lists some of the shells developed for micros.

## Some Problems

Enough profitable examples can now be quoted to silence the critics who maintain "It will never work!"; there are many such critics, and they tend to be in powerful positions. They *are* the experts, who through many years of study and patient practice have become so expert, and now enjoy some well-deserved returns in terms of respect and well-paying positions. They now exhibit the same fears and disbelief shown earlier by tradesmen who felt threatened by automatic machinery or CAD/CAM systems, and by clerical workers who were worried by database and accounting applications of computers.

The difference is that the experts who now feel threatened are perhaps more articulate in their objections and may be in more powerful positions. They are therefore better placed to delay the introduction of this threat to their position.

However, that is not all. There are real difficulties, rather than lack of co-operation, associated with extracting expert knowledge from an expert. The transition from human know-how to human say-how is slow and difficult, even with a very willing expert. The expert knowledge, since it is gained from experience rather than from books, is generally hard to put into words, and this has been found to be the slow step in developing an expert system.

The more complex the domain, the more difficult it has been found to articulate the knowledge. This has become known as the 'Feigenbaum bottleneck' after Edward



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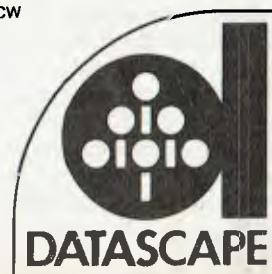
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Feigenbaum, who first clearly identified the problem. Fortunately, a way around has been found. If the expert can't readily express his or her knowledge in the form of rules to be programmed into the computer, we can try to make the computer do this by feeding it a large number of cases of the expert's work and inducing from these the hidden rules which he or she has perhaps unconsciously applied. Professor Ross Quinlan, Head of the School of Computing Sciences at the NSW Institute of Technology, has been at the forefront of this development.

Such inductive reasoning programs are now available, and can greatly increase the speed of developing expert systems. They form part of the kit of tools on which the knowledge engineer can now draw. Examples of such systems include Expert-Ease, Ex-Tran and RuleMaster.

Nevertheless, it still requires special knowledge and skill to develop an expert system. Many choices have to be made as to how to best represent the knowledge and how to structure the knowledge base in a particular application. Very few people are trained in knowledge engineering, so most will have to learn by experience, the very thing we are trying to minimise by the development of expert systems. However, since expert tutoring is one of the applications of expert systems, it's to be hoped the developers of expert system shells will put some effort into providing expert tutors with their shell, as opposed to the simple mechanical tutoring systems which come with so many software packages.

## Where to Use Expert Systems

In discovering good applications for expert systems we should look for a number of features. First, the problem must be worth solving, and secondly the expertise required to solve the problem must be relatively scarce — but not extremely so, or there will be no access to the expert. A symbolic problem is generally more suitable than a largely numeric one, although the user interface with standard numeric processing software can be an excellent application for an expert system.

The size of the problem is typically such that the expert would solve it in no more than a few hours, otherwise it would probably be too difficult a problem for the current state of the art of expert system technology. Ideally the problem domain should be clearly bounded rather than

*Any area where top-rate expertise is rare and hence expensive is potentially a good application, and we can expect in a few years that this exclusivity will filter down to such a level that we will be able to buy such packages as expert tax advice or gardening, or any of a number of 'adviser' packages.*

Expert-Ease — \$ 1,200.00; System, 169 Unley Road, Unley 5061

Exsys — Expert system development package, \$US300. Exsys Inc, PO Box 75158 Contr. Sta., 14 Albuquerque, NM 87194, USA.

Insight Knowledge System — \$US95. Level 5 Research, 4980 South A-1-A, Melbourne Beach, FL 32951, USA.

M.I — Teknowledge, Palo Alto, California, USA. \$US2000.

Personal Consultant — \$US3000. Texas Instruments, Dallas, Texas, USA.

TIMM — The Intelligent Machine Model, General Research Corp, Santa Barbara, California, USA.

TESS — The Expert System Shell. Helix Expert Systems Ltd, 11 Ludgate Circus, London EC4M7LQ, England.

APES — Augmented PROLOG for Expert Systems. Logic Programming Associates Ltd, 10 Burntwood Close, Dept ES/1. London SW183JY, England.

Table 1.

Some expert system development tools for micros.

open-ended, and there should be general agreement about the knowledge applying to the problem rather than conflicting theories and approaches.

A good-sized problem will involve up to 200 concepts and may require several thousand rules. A rule of thumb in expert system development is that a good knowledge engineer can on average produce about 10 final system rules per week, so a fairly large, useful expert system will probably take several man-years to develop to a finished product. This time can be reduced significantly if a good part of the knowledge has already been formalised, and if a database of previous expert decisions is available. Ideally, the application will also allow incremental progress to be made and measured by splitting the overall domain into smaller sub-domains, which can be initially treated as separate problems.

The benefits from the use of expert system technology are varied, as shown in Table 2. They can't always be expressed in dollar terms, but are nevertheless valuable results.

So, to return to our original question, what's so special about expert systems? I suppose they represent a new class of software, and introduce an exciting new way of thinking about the use of computers. Good expert systems will provide big commercial gains for their users, and possibly for their developers. It will be interesting to see how expert systems technology lives up to its promise.

## More Information

If this introduction to expert systems has whetted your appetite and you want to learn more about them, I suggest you start asking your friendly librarian for some of the following books, and watch *Your Computer* for news and reviews of some of the expert system shells as they become available.

*Introductory Readings in Expert Systems*, D Michie, Gordon and Breach, 1982.

*Building Expert Systems*, F Hayes-Roth, D A Waterman and D B Lenat, Addison-Wesley Publishing Company Inc, 1983.

*The Fifth Generation*, E A Feigenbaum and P McCorduck, Addison-Wesley Publishing Company Inc, 1983.

*Building your own Expert System*, C M Naylor, Sigma Technical Press, 1983.

*The Commercial Application of Expert System Technology*, T Johnson, Ovum Ltd, London, 1984. □



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# SWINKELS SELLS SHELLS SYSTEM

*Expert systems can be written in many languages and for many different machines. In this article, Dom Swinkels looks at writing an expert system on a microcomputer, using one of the number of expert system shells now available for micros.*

---

One of the first teaching expert system shells to appear on the market was Expert-ease, based on research work carried out at the Turing Institute at the University of Edinburgh, and available locally in both demo and fully operational versions through System, 169 Unley Road, Unley 5061. A demo package consists of the full manual and software, and will give you a good feeling for what the system can do.

Expert-ease enables the user to construct expert systems without any knowledge of programming. It has a spreadsheet format and collects data by guiding the user through a series of prompts. You will need to read the manual and work through the tutorial to get the hang of it.

Once you have responded to the prompts the program can answer questions based on the information fed in. The central aim of the program is to define various possible outcomes by listing characteristics or attributes.

## Using Expert-ease

Expert-ease generates several screens designed for specific aspects of developing an expert system. The first of these is the attribute screen, on which you must define the results or conclusions to be reached by your expert system — for our expert sys-

tem task I've selected the identification of current Australian coins.

You then define the attributes to be used in identifying the coins and the possible values for each of these attributes. The distinguishing attributes of coins are colour, shape, size and number and the possible values for each are shown in Table 1. I've added an attribute called 'queen', which indicates whether an image of the queen appears on the coin. This will be used to distinguish Australian coins from other current coins. To allow for the possibility of foreign coins I've also defined a coin named 'notaustr'.

Having nominated our attributes, we go to the example screen and start providing Expert-ease with examples of current Australian coins. The five attributes already defined appear at the top of the screen. As you move the cursor to any position under

these headings the list of possible values will appear on the bottom. The user selects one to create each example. If a particular attribute can have any of the possible values enter '\*'. Table 2 shows the list of examples provided.

When a sufficient number of examples has been entered, you ask the system to derive a rule by pressing '!'. After a short pause the rule screen appears with the rule it has derived (see Figure 1). The first attribute tested is 'queen', which can have the values 'yes' or 'no'. If the answer is 'no' the value of the coin is immediately presumed to be 'notaustr'. If the value of 'queen' is 'yes' the attribute 'size', which can have values 'large', 'medium' or 'small', is tested next. This evaluation continues through the decision tree until one of the results is reached.

You can make your expert system a little ►

Attribute:	queen	colour	shape	size	number	coin
	yes	yellow	round	large	one	ten cent
	no	silver	flats	medium	two	twenty cent
		bronze		small	five	fifty cent
						one dollar
						not austr

Table 1. Attributes for identifying current Australian coins.



	queen	colour	shape	size	number	coin
1	yes	yellow	round	medium	one	one dollar
2	yes	silver	flats	large	five	fifty cent
3	yes	silver	round	large	two	twenty cent
4	yes	silver	round	medium	one	ten cent
5	yes	silver	round	small	five	five cent
6	yes	bronze	round	small	two	two cent
7	yes	bronze	round	small	one	one cent
8	no	*	*	*	*	not austr

Table 2. Examples of coins.

more friendly before running it by going back to the attribute screen and associating some text with each of the attributes and conclusions; for example, you might associate the text 'Is there a picture of the queen and the word Australia on one side of the coin?' with 'queen'. Similarly, you can associate the text, 'Which colour best describes the colour of the coin?', with the attribute 'colour', and so on.

You can also associate text with the conclusions. Without such text the default statement, 'The value of the coin is one dollar', is used. By associating the text, 'This coin is', with 'coin' and 'a current Australian one dollar coin' with 'one dollar' the output becomes 'This coin is a current Australian one dollar coin'.

Note in the rule shown in Figure 1 that the medium-sized bronze coin has the value 'null'; this means no example was provided which allowed this combination

of attributes to be defined. If you are developing a more complex system you're likely to get a number of such null results in the first round. All you have to do is go back and provide additional examples covering such cases, and derive the rule again, based on the new set of examples.

## Bigger Expert Systems

The above coin identification is only an example of an expert system shell. Expert-ease is capable of handling problems with up to 31 attributes and 32 values for each logical attribute, and also allows integer attributes such as the weight of coins in grams or the diameter in millimetres (with values from -32766 to 32767). You can have as many examples as can fit in memory — typically 200 to 300.

The number of attributes and attribute values is probably greater than can be

used. More useful than the amount of attributes is the ability to call another problem from disk with each conclusion. The Australian coin problem could therefore be a small section of a complete coin identification system, consisting of a number of segments for each country linked together with an initial country selection program.

Disk space is the only limitation. Individual problems can be chained together in the form of trees, chains or even loops, and according to the manual around 17 problems can fit on a floppy disk.

The approach used for the coin identification problem can be used to identify stamps, plants, birds, paintings and so on. When you combine a number of small programs of this type you move from a toy system to a 'technician' system (a system which performs with above average skill and knowledge, but can't be called 'expert'). As you enter more knowledge and include not only the world's current coins but also all past coins, your system becomes expert.

The beauty of it is you can always add this knowledge incrementally. When you find a new coin, you run the system and the final identification will be correct, null or incorrect. A 'null' answer means the system couldn't identify the coin and you have to add it as a new example and derive the rule again. If an incorrect identification is made you may have to add a new attribute to the system to distinguish between the new coin and the incorrect identification given.

## Where Next?

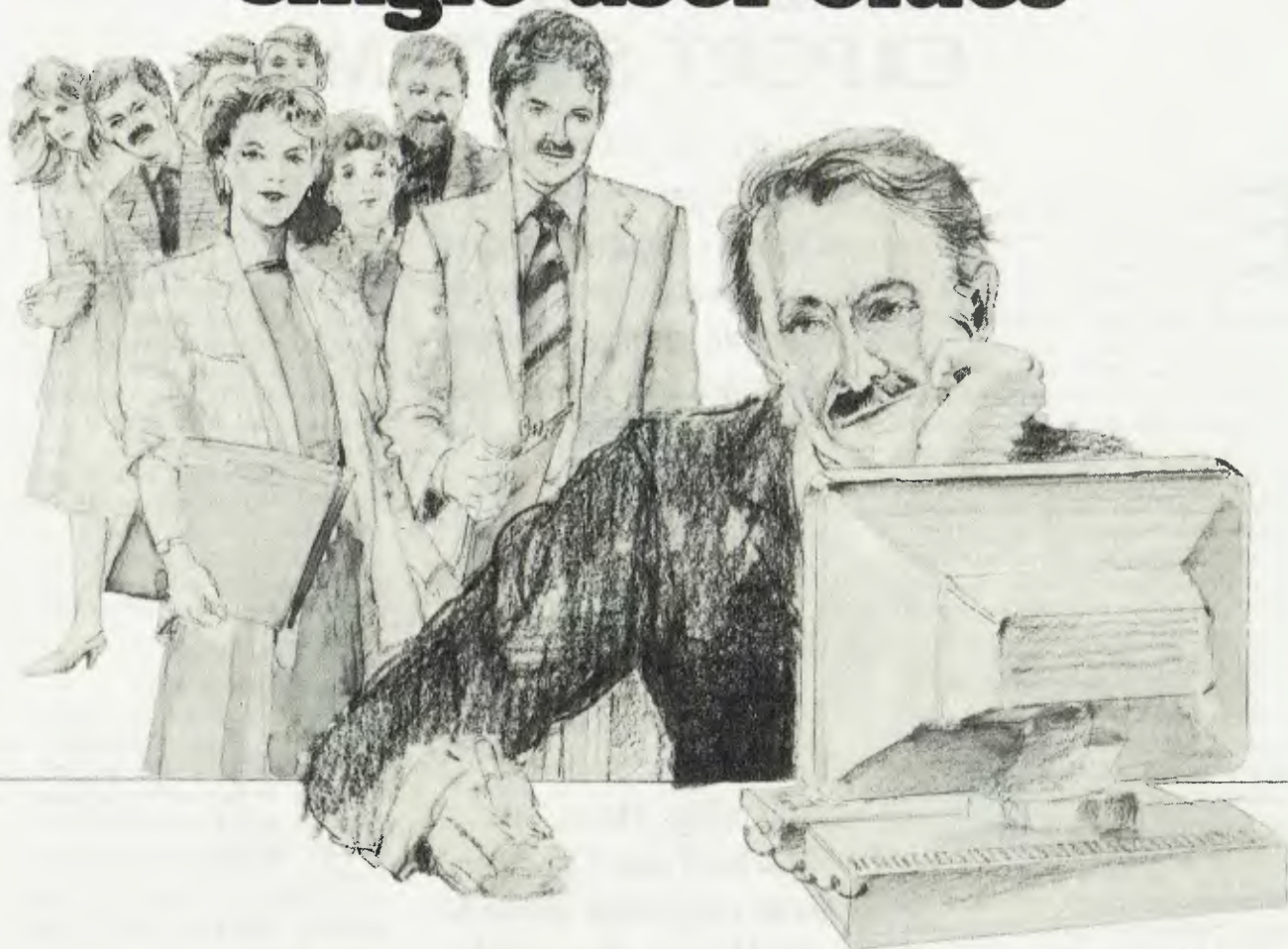
Is Expert-ease the answer to all our prayers? As a piece of expert system shell software it's a major step forward. However, it only addresses a particular type of problem and can't cope with uncertainty of any kind. It's particularly suited to decision tree problems. In addition to the applications listed earlier, it can be used for all kinds of fault-finding in electronic or mechanical equipment, and is useful for finding patterns in data. However, it can't explain why it asks for certain information, so it can't be used for educational and training purposes in the problem domain. There are other products with this capability coming on the market and we'll be looking at them in a new column called 'Your Expert Computer' over the next four months. □

Figure 1. Rule derived from examples in Table 2.

queen
yes : size
large : shape
round : twentycent
flats : fiftycent
medium : colour
yellow : onedollar
silver : tencent
bronze : null
small : number
one : onecent
two : twocent
five : fivecent
no : notaustr



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## BUILD YOUR OWN EXPERT SYSTEM

BY TIM HARTNELL

**E**xpert systems can do all the things described in the introduction and more. This is because expert systems, one of the 'hot' areas of current artificial intelligence research, can hold 'frozen' human expertise in a way which ensures it is applied tirelessly, and without error.

The world is short of experts in many areas; for example, significant portions of the globe have insufficient medical and engineering personnel. Expert system enthusiasts claim their programs can help overcome this shortage.

There has been a lot of interest in, and euphoria over, expert systems in recent years. In this article, I'm going to give you the means of assessing for yourself the possibilities of such programs, with an expert system shell which will train itself to become an expert on just about any subject under the sun. Once you've run our program, and modified it to your own specifications, you'll be in a strong position to enter the expert systems debate with the backing of real experience.

Of course, our expert system will be a little primitive compared to many of the systems currently in use. Despite this, you'll find it performs well, and is a fascinating example of 'machine intelligence' in action.

The major parts of an expert system are shown diagrammatically in Figure 1.

The knowledge base in many expert systems is basically a collection of IF/THEN statements, such as:

IF X AND Y ARE TRUE THEN C IS TRUE

Imagine a program which took the place of the man at the garage who finds out what's wrong with your car. Such an expert system might contain lines of coding which meant 'If the starter doesn't click then the solenoid is probably faulty'. This kind of system would probably work by first asking the user to define the basic problem, from where it could lead the user down a tree of possibilities, branching off from time to time as a result of the user input.

This would be an example of 'forward chaining', seeking out the unique solution

*Intelligent computer programs known as expert systems have located valuable mineral deposits where human experts said none would be found.*

*Expert systems can diagnose disease, design microcomputer circuits too complex for the human mind, and can advise investors on how to minimise their tax liability. Here, Tim Hartnell gives you the basic shell from which to build your own simple expert system.*

---

which lies at the end of one particular series of branching.

Other more sophisticated expert systems use backward chaining, in which a goal is chosen ('the car has no fuel') and questions are asked to establish the truth of this particular hypothesis.

As you can see from Figure 1, the two major parts of many expert systems (including the infectious diseases diagnostic program, Mycin, which we'll look at in some detail shortly) are called the knowledge base (the stored expertise) and the inference engine (the reasoning mechanism).

As you know, a great deal of the information we know about the world is not cap-

able of being reduced to numbers. Our lives are riddled with situations where phrases like 'it seems likely', 'often', 'sometimes' and 'I don't know why, but I get a feeling you'll discover the problem if you ...' are more applicable than black-and-white statements of fact. For expert systems to be of real use in the non-ideal, non-numerically-discrete world we inhabit, they must be capable of working with human concepts and perception. Although our expert system shell does only work with discrete yes/no, zero/one situations, it can be modified to reflect shades of truth (expressed on a scale from 0/false to 1/true). Even without this modification, you'll see it can perform surprisingly well.

### The Knowledge Base

This can be either encoded ('hard-wired') directly into the main body of the program, in which case it is more or less impossible to delete, or held within an addressable database, so that it can be accessed, modified and updated, even while the program is running. You'll see this happening with our expert system shell, which effectively builds for itself a set of rules to allow it to make decisions.

### Knowledge Engineering

In the case of both hard-wired and addressable database expert systems, the expertise must be acquired directly from a human expert (in contrast to our shell, which generates its own rules while it's running).

The process of extracting this information — and from it deducing the working rules which lie behind the human expert's judgment — is called knowledge engineering. At present, this task must be done by one person, the knowledge engineer, trying to uncover (and then systematise) the working rules of thumb used by another person, the expert. Unfortunately it's a slow and painful process — so slow in fact that it represents a serious bottleneck in the whole process of development of expert systems.

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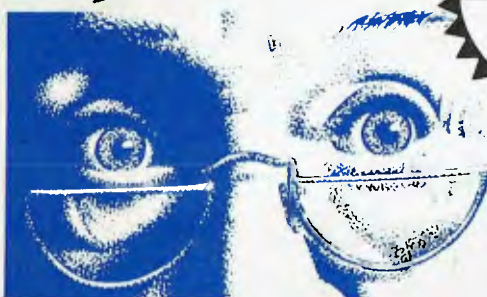
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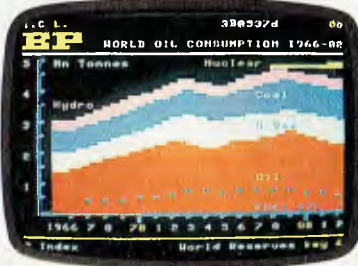
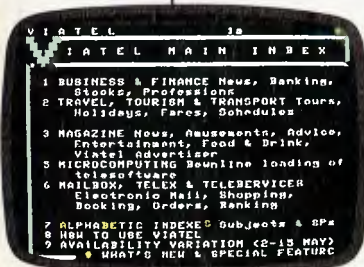
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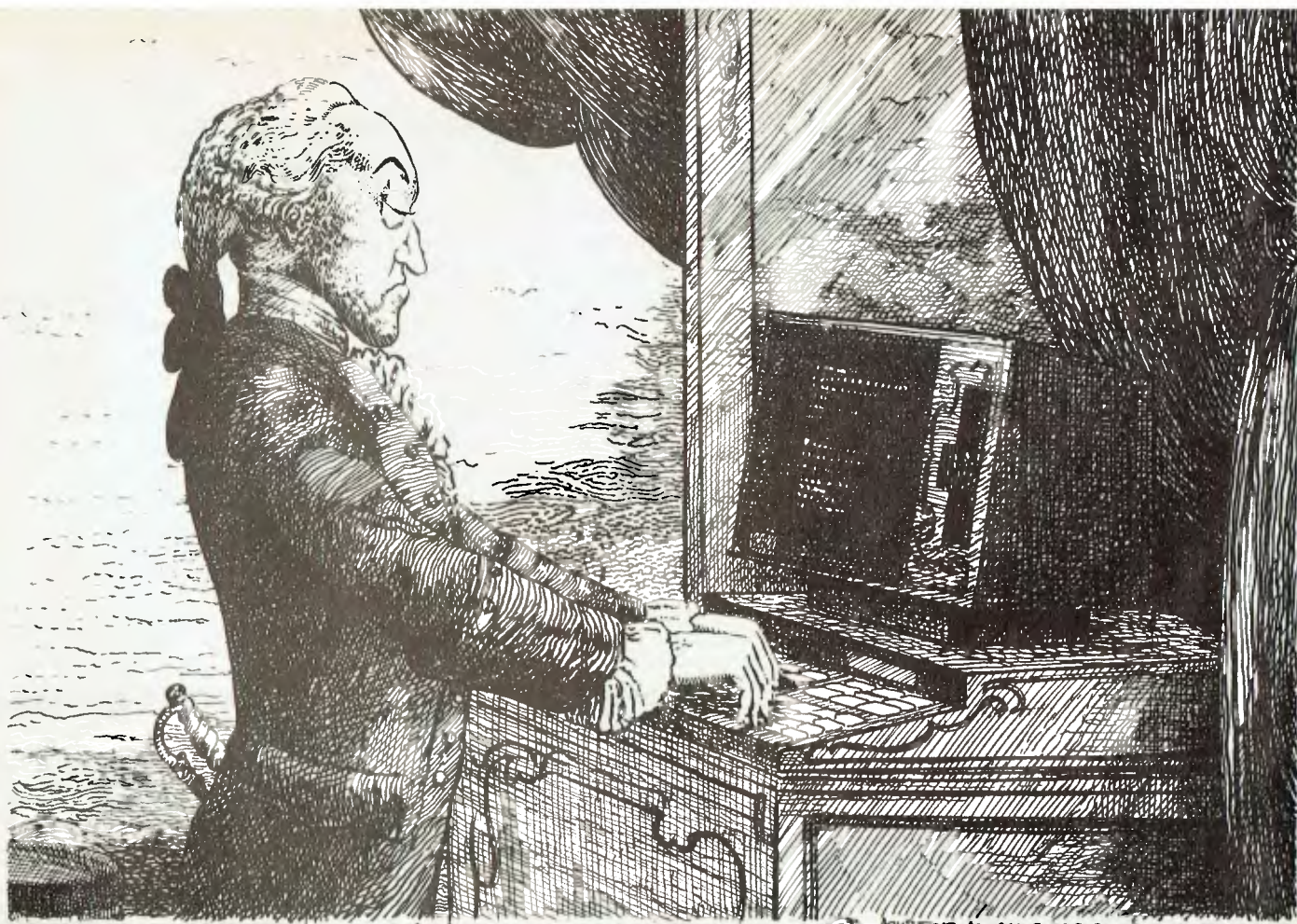
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way around the world in the field of 'machine learning' — the science of getting a computer to discover and encode the human expertise for itself. (A fascinating account of how one knowledge engineer, H Penny Nii, works is given in *The Fifth Generation*, E A Feigenbaum and P McCorduck; Reading, Massachusetts; Addison-Wesley Publishing Co, 1983; pp. 80-84.)

### The Mycin System

One of the best-known expert systems in the world is Mycin, which can give advice on the diagnosis and treatment of infectious blood diseases. Its knowledge base is made up of some 400 rules relating possible conditions and causes. To solve a problem, Mycin tests the conditions of one of its rules against the information it's been given about a patient, and can request

further data from the human doctor it is assisting.

According to the book *Building Expert Systems* (F Hayes-Roth et al; Reading, Massachusetts; Addison-Wesley Publishing Co, 1983; p 10), "When a panel of experts evaluated the performance of several different agents, including medical experts, interns, and Mycin, Mycin's performance was judged as good as, or superior to, that of all the others."

Developed at Stanford University in America, Mycin is regarded as a landmark program. It works well, and many of the ideas developed initially for Mycin are now more or less standard in many expert systems.

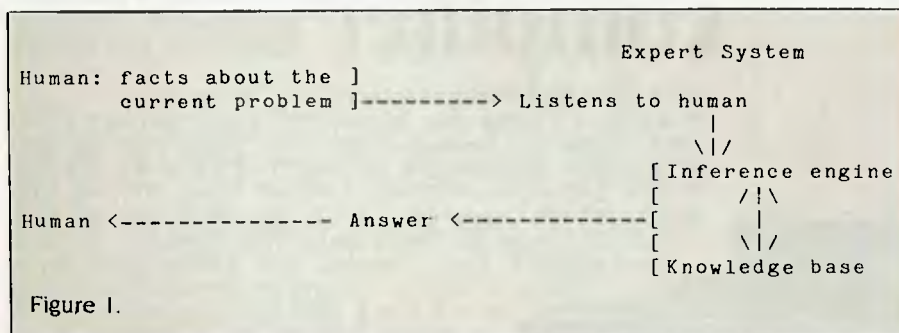
The system's developers started work on the system with the idea of following the lead of a program called Scholar, which was able to 'talk' very well on the geogra-

phy of South America. However, they found the medical data they were using did not fit as obviously into a neat framework as did the geographical facts, so the Scholar line was abandoned.

Experimentation showed the most fruitful developments lay in the direction of explicitly encoding specific rules — as used by human experts — which linked items in the database, rather than in trying to break the rules down to create general pathways which the decision-making process could follow. Holding the rules in this way also meant Mycin could explain why it had come to the conclusion it had, using the kind of statements which physicians themselves would use.

### The Rules

The first real problem the 'Mycin gang' (as the developers came to call themselves) had to come to grips with, once the nature of the rule base had evolved, was that human knowledge of infectious diseases did not fall into neat little mutually exclusive packages. The barriers between one item and the next in the domain were fuzzily defined. (The word 'domain' is used in artificial intelligence research to define the 'universe' within which a program demonstrates intelligence. The greatest success to date has been experienced with programs which work within a strictly limited domain.)





# Build an Expert System

Mycin's first implementation had 200 rules, which performed essentially as if they were lines being held in the form of an IF statement followed by a THEN, similar to those I mentioned earlier.

Here is a typical Mycin rule. If:

(1) the stain of the organism is gram-positive, and

(2) the morphology of the organism is coccus, and

(3) the growth formation of the organism is clumps,  
then there is suggestive evidence (0.7) that

coccus.

Note the number after the words 'suggestive evidence' (0.7), which indicates the degree of certainty which Mycin is placing on the conclusion.

The rule is printed out for the physician in the easy-to-understand form given above. However, the rules are held internally as LISP lists, in the following way:

PREMISE: (SAND (SAME CNTXT GRAM GRAMPOS)

(SAME CNTXT MORPH COCCUS)

(SAME CNTXT CONFORM CLUMPSI)

ACTION: (CONCLUDE CNTXT IDENT STAPHYLOCOCCUS TALLY .7)

I pointed out that knowledge engineering is a slow and expensive process. To allow Mycin to improve its database by gaining new knowledge and weeding out errors, inconsistencies and omissions, a subprogram was developed called Teiresias. When a physician comes across an error or an incomplete diagnosis, Teiresias can be triggered to ask a series of questions from which a new Mycin rule can be created.

Mycin has been designed to communicate with the consulting physician in as natural a form as possible, and this is ►

```
10 REM    EXPERT SYSTEM SHELL
20 REM [c] Tim Hartnell, 1985
30 REM    'YOUR COMPUTER'
40 REM
50 GOSUB 550:REM INITIALISE
60 CLS
70 PRINT "THESE ARE THE POSSIBLE OUTCOME
S:"
80 PRINT
90 FOR J=1 TO OTCO
100 PRINT TAB(J);A$(J)
110 NEXT J
120 PRINT
130 PRINT "PLEASE THINK OF ONE OF THEM"
140 PRINT
150 PRINT "PRESS RETURN WHEN YOU ARE REA
OY"
160 INPUT Z$
170 CLS
180 PRINT "PLEASE ANSWER 'Y' OR 'N' FOR
EACH OF"
190 PRINT "THE FOLLOWING IN RESPECT OF"
200 PRINT "THE OUTCOME YOU HAVE THOUGHT
OF"
210 PRINT
220 COUNT=0
230 X=.5
240 FOR J=1 TO FACT
250 X=X+X
260 PRINT F$(J)
270 INPUT Z$
280 IF Z$<>"Y" AND Z$<>"N" THEN 270
290 IF Z$="Y" THEN COUNT=COUNT+X
300 NEXT J
310 X=0
320 FOR J=1 TO OTCO
330 IF COUNT=B(J) THEN X=X
340 NEXT J
350 IF X>0 THEN 450
360 X=INT(RNO(1)*OTCO)+1
370 REM ** REJECTS ANSWERS KNOWN TO BE W

RONG **
380 FLAG=0
390 FOR J=1 TO OTCO
400 IF B(J)=0 THEN 430
410 IF X=J AND COUNT<>B(J) THEN FLAG=1
420 IF C(X)=COUNT OR O(X)=COUNT THEN FLA
G=1
430 NEXT J
440 IF FLAG=1 THEN 360
450 PRINT "YOU WERE THINKING OF ";A$(X)
460 PRINT
470 PRINT "ENTER 'Y' IF I'M RIGHT, 'N' I
F WRONG"
480 INPUT Z$
490 IF Z$<>"Y" AND Z$<>"N" THEN 480
500 IF Z$="Y" THEN B(X)=COUNT:GOTO 60
510 IF C(X)=0 THEN C(X)=COUNT:GOTO 60
520 O(X)=COUNT:GOTO 60
530 END
540 REM *****
550 REM INITIALISATION
560 CLS
570 INPUT "HOW MANY OUTCOMES";OTCO
580 PRINT
590 INPUT "HOW MANY FACTORS";FACT
600 CLS
610 X=OTCO+FACT
620 DIM A$(OTCO)
630 DIM F$(FACT),B(X),C(X),O(X)
640 FOR J=1 TO OTCO
650 PRINT "PLEASE ENTER NAME OF OUTCOME"
;J
660 INPUT A$(J)
670 NEXT J
680 CLS
690 FOR J=1 TO FACT
700 PRINT "PLEASE ENTER NAME OF FACTOR";
J
710 INPUT F$(J)
720 NEXT J
730 RETURN
```



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#### \*\*\*\* OPENING \*\*\*\*

##### ANTICIPATED COUNTERPART POSITION

##### FORGET A WIN-WIN STRATEGY

Expect Mr. James S. to make a tough opening offer. The only concessions you will hear are those designed to promote his interests...

##### TACTICS AND STRATEGIES

##### MAKE TOUGH DEMANDS

Overstating your demands gives you room to negotiate. When it comes time to make concessions, you will be able to trade with greater freedom...

##### CREATE AN EMOTIONAL DISTRACTION

Prior to discussion of important issues, try to distract Mr. James S.'s attention away from business...

##### USE THE SEATING TO YOUR ADVANTAGE

If possible, arrange the seating so that you sit near Mr. James S. Don't allow yourself to be seated across from him. Move your chair around so you can "hear better." Place your belongings on the chairs you don't want to sit in...

##### CONCEAL YOUR PRIORITIES

At the outset of the negotiation, choose a point on which you will lose little, but that Mr. James S. is concerned with. As the negotiations begin, work hard for that point. Later on, concede the point. This will sat him up to make concessions on issues important to you as the negotiation continues...

#### \*\*\*\* IN-PROCESS \*\*\*\*

##### USE THE GOOD GUY - BAD GUY TECHNIQUE

This strategy requires you to work with a cooperative team member. Have your partner become argumentative with Mr. James S. while you sit silently... Apologize to Mr. James S. for your partner's behavior. From then on, when Mr. James S. disagrees on an issue of high priority to you, subtly threaten to bring your partner back into the room...

##### USE MR. JAMES S.'S SHORTCOMINGS TO YOUR ADVANTAGE

Aspects of Mr. James S.'s positions will probably border on being unethical. Play on these areas in hopes of stimulating his fears about your doing business with him...

##### CALL MR. JAMES S. ON OBVIOUS MANIPULATIONS

You'll have to be ready to challenge Mr. James S.'s gambits. Counter his plays with tact and good humor. You may find it necessary to double check agreed-upon ground rules...

#### \*\*\*\* CLOSING \*\*\*\*

##### DON'T LET MR. JAMES S. NIBBLE AWAY AT YOUR PROFITS

Mr. James S. may ask you to make one last concession before he signs the papers. If this happens, acknowledge this tactic...

##### USE ULTIMATUMS

If Mr. James S. is resistant about closing the deal, you may need to give him an unpleasant incentive in the form of an ultimatum...

##### MAKE AN OFFER MR. JAMES S. CAN'T REFUSE

Mr. James S. is a negotiator who will jump at a deal if you make him an offer he can't refuse. When you are trying to gain his agreement on a proposal, add a little something to sweeten the bargain...

##### USE THE OFF-BOUNDS CONCESSION

Leave one concession as off-bounds throughout the negotiation. Then offer it only if Mr. James S. will agree to the overall deal. Tell him how much this concession means to you...

#### \*\*\*\* NEGOTIATION GAME PLAN \*\*\*\*

##### 1. OPENING

\* STRETCH YOUR DEMANDS SO THAT YOU HAVE ISSUES TO CONCEDE

\* DISTRACTING MR. JAMES S.'S ATTENTION COULD PROVIDE AN OPPORTUNITY TO ADVANCE YOUR OWN PROPOSALS

\* PUT PRESSURE ON MR. JAMES S. TO MAKE THE FIRST OFFER

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# Build an Expert System

clearly seen in a conversation with Teiresias. Computer output during rule formation includes such 'human' lines as:

"I hate to criticise, Dr, but did you know most rules in this area include ...?"

"Shall I try to write a clause covering ...?"

Once the new rule has been added to the knowledge base, it is checked, with the physician being led gently through the checking process:

"Rule xyz has now been added to the knowledge base. I will now rerun the consultation to check the effectiveness of your new rule. Get comfortable, since this may take a bit."

An expert system will often be used by people who are less expert than those whose expertise is encoded in the system. This means the reasoning behind the conclusions reached by the system will not always be apparent. Mycin has a subprogram called Chronicler which can answer questions regarding the therapy it has advocated. A dialogue with Chronicler looks like this:

*For expert systems to be  
of real use in the  
non-ideal,  
non-numerically-discrete  
world we inhabit, they  
must be capable of  
working with human  
concepts and perception.*

WHY DID YOU GIVE DRUG X FOR  
SITUATION Y?

X was prescribed for Y since:

- X is often used for Y in disease Z
- item Q of patient data shows intolerance to drug P
- X is not contraindicated

#### Your Own System

I pointed out earlier that many expert sys-

tems consist of a knowledge base and an inference engine. The engine works with the data in the knowledge base, and actually carries out the reasoning and reaches conclusions.

It was realised, shortly after Mycin was up and running, that the engine part of the program could work quite adequately with a different knowledge base. The engine was therefore detached, as EMycin (for Essential Mycin), and a number of offshoot programs such as Puff (for lung diseases) and Clot (for blood complaints) were soon developed around EMycin.

Our own program, the expert system shell, is like a very primitive EMycin. It is an expert with reasoning powers, but with no information upon which it can exercise these powers.

It's very easy to understand the program once you have it running on your own computer. It would be best if you entered the listing now, and then followed through the rest of this article while carrying out the demonstration as you read. The program has been written to work on most micro-▶

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# Build an Expert System

computers without modification (although if you're running this on a Sinclair computer such as a Spectrum or QL, you'll have to add a second dimension — such as 255 — to the string DIM statements in the initialisation section), so you should have few, if any, problems in getting it running.

Unfortunately, our program won't be much good at medical diagnosis, although it's pretty handy at more down-to-earth tasks such as the one I've set for it in the sample run: to tell the difference between three computer languages (BASIC, Forth and Pascal).

The program is largely 'soft', in that the reasoning mechanism is built in, while the data must be fed in each time the program is run. There is no reason, if you want to turn our shell into a proper working expert system, why you can't keep the information it needs in DATA statements, to be read in each time you run the program.

The expert will first ask how many 'outcomes' you are dealing with (in our case, the outcomes are the three languages),

*When a panel of experts evaluated the performance of several different agents, including medical experts, interns, and Mycin, Mycin's performance was judged as good as, or superior to, that of all the others.*

and the number of 'factors' you'll be using to differentiate between these:

HOW MANY OUTCOMES? 3

HOW MANY FACTORS? 3

If this were a medical diagnosis program, the outcomes could be 200 frequently occurring diseases (such as 'Bubonic Plague'), and the factors could be 90 symp-

toms (such as 'persistent thirst'). Once you've told our expert the outcomes and factors, it asks you for details on these. First, the outcomes:

PLEASE ENTER NAME OF OUTCOME 1

? PASCAL

PLEASE ENTER NAME OF OUTCOME 2

? BASIC

PLEASE ENTER NAME OF OUTCOME 3

? FORTH

And then the factors:

PLEASE ENTER NAME OF FACTOR 1

? ENCOURAGES STRUCTURED PROGRAMMING

PLEASE ENTER NAME OF FACTOR 2

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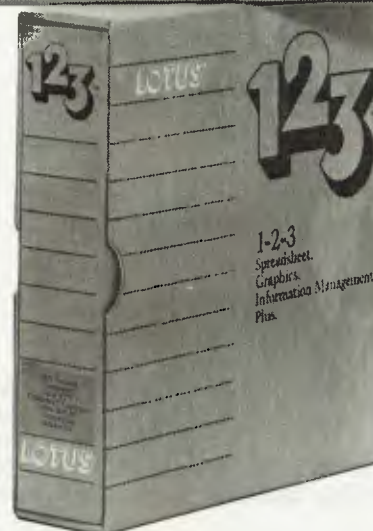
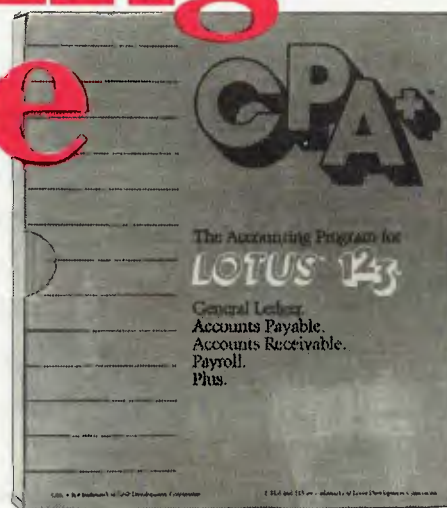
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# Build an Expert System

five samples before the program could differentiate, without error, between the three languages), although 200 diseases and 90 symptoms would take considerably longer.

Here's part of the training session, in which the expert gets it wrong:

THESE ARE THE POSSIBLE OUTCOMES:

PASCAL

BASIC

FORTH

PLEASE THINK OF ONE OF THEM

PRESS RETURN WHEN YOU ARE READY

?

PLEASE ANSWER 'Y' OR 'N' FOR EACH OF THE FOLLOWING IN RESPECT OF THE OUTCOME YOU HAVE THOUGHT OF

ENCOURAGES STRUCTURED PROGRAMMING

? Y

CAN BE EXECUTED DIRECTLY

? N

AVAILABLE FOR MOST MICROCOMPUTERS

? Y

YOU WERE THINKING OF BASIC; ENTER 'Y' IF I'M RIGHT, 'N' IF WRONG

? N

However, once it has been through the training session, our expert will be right every time:

PLEASE ANSWER 'Y' OR 'N' FOR EACH OF THE FOLLOWING IN RESPECT OF

*Many expert systems consist of a knowledge base and an inference engine. The engine works with the data in the knowledge base, and actually carries out the reasoning and reaches conclusions.*

THE OUTCOME YOU HAVE THOUGHT OF  
ENCOURAGES STRUCTURED PROGRAMMING

? Y

CAN BE EXECUTED DIRECTLY

? Y

AVAILABLE FOR MOST MICROCOMPUTERS

? Y

YOU WERE THINKING OF FORTH

ENTER 'Y' IF I'M RIGHT, 'N' IF WRONG

? Y

As I pointed out earlier in the article, our expert system works only with yes/no, black/white, zero/one situations in its present form, but there is no reason why you couldn't modify it to accept degrees of certainty (with — for example — 'always'

given a value of 1, 'nearly always' as 0.75, 'sometimes' as 0.4, 'hardly ever' as 0.1 and 'never' as 0) and thus make it much more useful in real-world situations.

I'd be very interested in hearing about any programs developed from this shell. Perhaps a future article could discuss ways in which the expert system has been employed. You can write to me care of the magazine.

## Further Reading

If you want to learn more about expert systems, the following books may be of interest:

*Rule-Based Expert Systems* — B Buchanan and E Shortliffe (Addison-Wesley, 1984).

*Exploring Expert Systems on your Microcomputer* — T Hartnell (Interface Publications (Australia) Pty Ltd/Pitman, 1985).

*Expert Systems — Principles and Case Studies* — R Forsyth (ed) (Chapman and Hall, 1985).

*A Practical Guide to Designing Expert Systems* — S Weiss and C Kulikowski (Rowman & Allanheld, 1984).

*Introductory Readings in Expert Systems* — D Mitchie (ed) (Gordon & Breach, 1982). □

Tim Hartnell is author of *Exploring Expert Systems on Your Microcomputer* (Interface Publications, 1985) and *Exploring Artificial Intelligence on Your Commodore 64* (Interface Publications, 1984). Versions of the AI book are available for the BBC Micro, Spectrum and QL. □



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**Video Response:** 20MHz  
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**Display Time (H x V):** 44Ms x 18.99msec  
**Resolution:** Centre 1,000 lines  
 Corner 800 lines  
**Display Formats:** 9 x 14 matrix, 2000 characters in  
 80 x 25 format  
**Input Terminals:** 9 pin "D" type connector  
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# Super-intelligent Games

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BY IAN ALLEN

## SUPER-INTELLIGENT GAMES

*Not so long ago, we saw computer games pioneering the application of high-res graphics in micros. Perhaps it's not surprising to find they are now pushing micro frontiers in the area of artificial intelligence.*

---

Once upon a time the sceptics maintained intelligent machines were impossible. When confronted with early computers like ENIAC, they said they were only glorified calculators: "Garbage in, garbage out". As the computers became more powerful the arguments changed; the sceptics said no computer could ever be 'clever' enough to beat a grand master at chess ... but it wasn't long before one did. Someday, someone will write a thesis on how the yardstick against which intelligence is measured is always redefined when computers approach it. At the moment the fall-back position is that although computers can be clever, they can't think intuitively like humans — at least not yet ...

All this resistance may be a mere function of human ego — at least that's something computers don't have yet — but the truth is we (humans, that is) really *don't* understand our own intelligence and intuition. The great irony is that our best models of the thinking process are actually derived from computer science! For example, the separate processes involved in short-term and long-term memory are often explained using the analogies of a computer's RAM (short-term memory) and its magnetic disk storage (long-term memory). Arguments about natural instinct often use the model of a computer's ROM — ROM being the part of the machine's programming which exists from the moment it is turned on — the moment of 'birth'.

Computer games are a specialist area in the science of programming. They are designed to entertain, and to do so they must somehow attract and hold the attention of a human mind. Game programmers have had to confront the limitations of computers and turn them into advantages.

Computers 'think' in numbers; they can't see, they can't feel and they have no intuition. How do you program a computer opponent to stimulate a person's interest? In the past, the writers of computer games have employed a number of techniques, most relying on exploitation of the inherent differences between humans and computers.

### 1. Computers can calculate faster

We've all seen games where reaction speed is essential. No matter how good your eye-to-hand co-ordination, the computer will eventually win — but it keeps you occupied trying to beat it for as long as possible. This technique is commonly used in arcade-type games.

### 2. Give the computer 'player' more resources

The computer never runs out of 'invaders', but you, the human, always run out of ships. In strategy games the human has to contend with a computer player with some inherent advantage: its pieces are stronger or faster, or have a better growth rate, and so on. Part of the challenge of the game is for the human player to overcome this resource disadvantage.

### 3. Hidden Information

The computer has access to knowledge denied to the human: its pieces always avoid the traps, mines et al, while the human player finds them the hard way — which is part of the fun.

### 4. Cheat

There are lots of ways to cheat. Perhaps the most common is to exploit the fact that the computer always has access to the human player's moves. If the game routines use this information when working out the computer's moves, the machine will always be one step ahead. This technique is most applicable in strategy games, and its usual result is to make the game less satis-

fying for the human player. However, some clever humans may be able to create ruses to trick the computer player.

### But is it really Intelligent?

None of these techniques can be called intelligent — certainly not in computer terms. They are what they are, sleights of hand creating an illusion of challenge. No matter how clever the graphics or sound, once the human player perceives the trick, or in some cases the pointlessness, his or her interest is lost.

To get around this problem, game designers have explored two new directions. One is in the area of 'interactive' games such as the Infocom series. These games are essentially puzzles, but the clues given and the progress made depend on the actions of the human players. However, the possible actions/reactions, while appearing to stem from the player's input, are actually pre-programmed around a variety of predictable responses, so they can't really qualify as 'intelligent' games.

The second direction in games programming is to actually attempt to incorporate some form of intelligence in the games.

The favoured method to simulate intelligence is to use some form of 'expert system'. Expert systems are based on the observation that humans, both expert and non-expert, generally use a series of 'rules of thumb' to evaluate situations and solve problems. For example, if you turned on your computer and nothing happened, your first rule of thumb might be to check if it is plugged to the mains. If that's not the problem, your next intuitive move might be to make sure the monitor is turned on, and so on. If you fail to find a solution by the time you've exhausted all your rule of thumb tests, you'd probably conclude that you need to seek help.

These rules of thumb in fact generally



## Super-intelligent Games



grow out of an individual's pool of experience. With any given problem there are a number of potential solutions, so when faced with the problem, people draw on their knowledge of similar situations, add it to the present situation and then determine the action they will take.

### Making the Computer an Expert

It is possible to program these rules of thumb into a computer. In theory, if you had a big enough computer, you could program into it all the rules of thumb of all the problem-solving experts in the world. It would then not only appear to be, but

would be, considerably better at problem-solving than any one of the experts. (Unfortunately, even if such a system ran each nation we might still have wars, since its actions would still be based on human rules of thumb!)

In practice, such a task is beyond even the biggest computers (they're working on it), but even micros are capable of 'considering' limited situations. We're already seeing commercial applications in fields

as diverse as medicine and oil exploration. Why not in games?

The Strategic Studies Group is a small Australian software house which has done just this — and in doing so has cracked the notoriously difficult United States games market. It has not only secured distribution with Electronic Arts (one of the biggest American distributors) but has secured it on a non-exclusive basis, allowing the company to build its own American distribution network at the same time. Such arrangements are uncommon when dealing with the major US distributors, and were only made acceptable because





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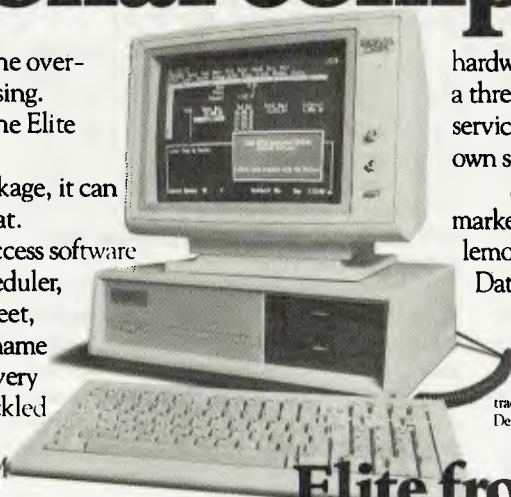
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# Super-intelligent Games

SSG's games are undisputed leaders in their implementation of artificial intelligence.

SSG was formed in 1983 by Ian Trout and Roger Keating; both were ex-teachers and both shared a passion for game simulations. Between them they had around 25 years of gaming experience. 'Reach for the Stars' was their first joint effort, with Trout taking on the role of game designer and Keating doing the actual programming. When it was released in 1983 its intelligence was light years ahead of any comparable strategy game; the computer players actually seemed to think for themselves and to adopt distinctly different personalities and tactics. The game was always rewarding and fun to play and replay.

In spite of the fledgling SSG's limited promotion budget, word of mouth made Reach for the Stars a hit and SSG's viability was ensured. Now in its second edition, 'Reach' is regarded as something of a classic by the gaming fraternity.

## Snowballing in the United States

It was SSG's second game, 'Carriers at War', that captured the imagination of the United States market. Its success also drew attention to the earlier under-promoted Reach for the Stars, creating a snowball effect in sales. In the first six months of this year SSG saw a ten-to-twentyfold increase in its United States turnover, and orders for its third game, 'Europe Ablaze', were at record levels even before the August release.

'Carriers' is a re-creation/simulation of the Second World War air and naval battles in the Pacific. It is remarkable for its flexibility. In solitaire games, where one person plays the computer, you have a range of options to vary the conditions of the game: you can choose any of six pre-programmed scenarios; you may command either side of the battle; you may alter any of the historical forces; and you can even create entirely new scenarios that never happened in history. This is only possible because the computer player is capable of 'thinking' for itself.

Says Keating, "Carriers is a unique product. It's effectively one of the first computer games where the computer doesn't have any pre-programmed analysis of the situation. It makes its decisions solely on what information it is given."

In actual play, the computer player is no more predictable than a human counterpart. It is capable of undertaking daring

*Your air crews have minds of their own. If you order them to attack one target, and they happen to see a better one once on their way, they will go for the better target. They also exaggerate enemy losses.*

and risky manoeuvres, or it might play conservatively. You can never be sure. The intelligence routines work on a number of levels and even apply to your own forces.

For example, your air crews have minds of their own. If you order them to attack one target, and they happen to see a better one once on their way, they will go for the better target. They also exaggerate enemy losses. In the Second World War pilots were notorious for this; over 40 Japanese carriers were reported as confirmed 'sunk', when in fact less than a dozen ever existed in the entire war! The net effect is a game that very realistically recreates the uncertainties of the Pacific War.

"It's not just a game. If you're going to simulate a historical event and allow people to participate in it, you should do it so well that it gives people insight into why battles were fought and why wars were won. The only way they are going to get any historical value out of it is if the computer evaluates its play in a human-like way," explained Ian Trout.

How does the computer play in such a human-like way? "Heuristics!" answers Keating. Heuristics, according to the *Macquarie Dictionary*, is "a method of solving problems for which no algorithm exists, which therefore depends on inductive reasoning from past experience of similar problems". It sounds suspiciously like a definition of expert systems.

The SSG team is in fact using an expert system. The computer player considers every possible move; with each option it calculates an 'optimum' value based upon up to 50 different factors, including at least one random one. The factors are weighted according to a human 'rule of thumb' priority system. For example:

Factor 1. It's a good idea to attack the

closest enemy airbase (since it's the biggest threat).

Factor 2. It's a good idea to attack enemy bases which have large air groups stationed there.

Factor 3. It's a good idea to attack a target if it is one of your scenario objectives.

Factor 4. It's generally a good idea to attack the enemy anyway.

And so on for Factors 5-50.

The move, or moves, which produce the highest 'optimum' rating are the choice accepted, and the computer proceeds accordingly. Among the 50 other factors considered are elements such as the fatigue of the air crews, condition and type of aircraft available, weather, time of day and enemy activity.

"The trick", says Keating, "is to make the computer player decide more or less what an intuitive human player would, given the same information."

The word 'heuristic' comes back when describing how Keating and Trout arrive at all the important weightings they apply in their games. There is a certain amount of trial and error, but the key lies in their collective pool of experience, their own rules of thumb, gained the hard way from their accumulated experience in gaming and game design.

In essence, what they have achieved is the design of a method of translating observed facts into some sort of numeric relationship that is coherent to a computer. They have also taken the second step, enabling the computer to interpret this information and act upon it. All this again raises the unanswered question: "What is intelligence anyway?"

## Humble Beginnings — What Next?

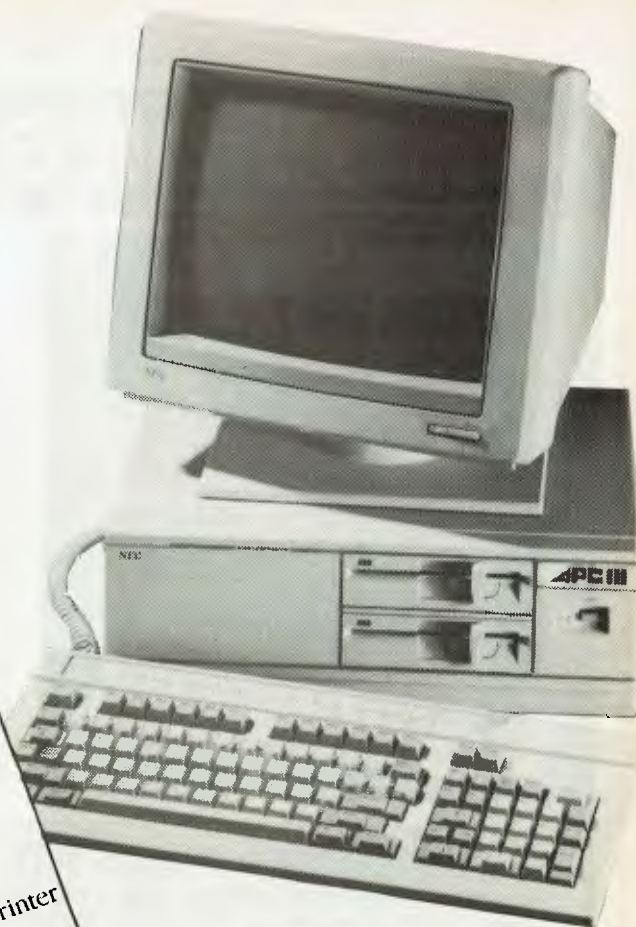
The Strategic Studies Group has implemented all this on the humble 8-bit Apple II and Commodore 64. While its particular interest has been innovatively applied to games and simulations, it's easy to see how the same techniques could apply to any manner of things, from solving the logistic problems of the military through to engineering a bridge or keeping a construction to a projected critical path.

What will happen when the same techniques are applied to more powerful fourth and fifth-generation machines? Is the human ego facing a Waterloo in the near future? Given the present human-engineered mess in the world, could computers do worse?

And I wonder what the sceptics will say next. □



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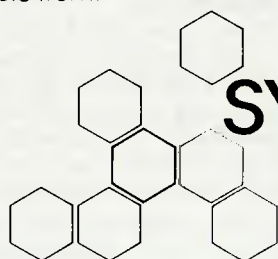
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# THE SALES EDGE

*Stiffen yer sails for a salesman's broadside. Here comes Frank Lee with an aggressive Sales Edge. This program has the characteristics of an expert system, which gives it 'upfront' status in our special Artificial Intelligence issue. Will the power of tomorrow's salesmen be measured in MIPS?*

---

**E**xcuse me Madam; no, I'm not another encyclopaedia salesman. No no. I have the most incredible bookcase offer — and it's just for you. And at no extra charge, we pack it full of the best encyclopaedias in the world — all for nothing! Just buy the bookcase at our special bargain price, and the free gift is yours! How much? Don't let's worry about that right now. The important thing is what you need for the proper education and welfare of your children. What's that? No children? You're what? A nun? Oh, I do beg your pardon, Sister — I was just so keen to .. What's that? Would I like to donate to the Order of the Little Jumping Sisters of Saint Cinderella? Ah ...

According to Dr Ronald Warren, author of *The Sales Edge*, each sales approach must be based on two factors: the personality of the seller, and the personality of the potential buyer. Ignorance of either may result in a scenario worse than the above.

You and I may not be salespeople in the literal sense, but many of us are required from time to time to sell something — even if it's just an idea. *The Sales Edge* is concerned with effectively convincing someone else to accept what you are offering, at your price.

My first reaction to a product which purports to provide keen insights into the selling process — something like an expert system — was less than enthusiastic. After all, it takes a certain type of individual to become embroiled in the sales game. I would have thought that the best salespeople function instinctively, and think on their feet. They need a good knowledge of their product, and a sound understanding of human psychology. How then could a mere computer program be part of the

dynamics of one-to-one selling?

Well, it seems *The Sales Edge* has something going for it. My feeling is that its overall architecture lends itself to the construction of similar 'expert' systems based on the characteristics of the two interacting entities.

### Technical Considerations

In principle, the program obtains two 'profile vectors', one describing you, the salesperson, the other describing the 'prospect'. These vectors are binary, the elements corresponding to true/false assessments of personal characteristics. As such the two vectors have many dimensions. There is also a library function enabling these vectors to be stored and readily updated. Although there is only one vector defining the seller, there are normally many 'prospect' vectors. A suitable algorithm uses the salesperson's vector and the selected prospect's vector to determine which statements to retrieve from a library in order to construct the report on recommended procedures. This library contains pseudo-variables which the report generator substitutes with appropriate names.

Clearly, the validity of the system rests heavily on the design of the algorithm, and it is clearly difficult (especially in a short review) to assess the algorithm apart from a large number of test situations.

Also dependent on the expertise of the designer are the questions linked to the elements of the profile vectors. This reviewer simply does not have the psychological expertise to comment on their selection, apart from the observation that they "seem reasonable".

### The Documentation

The product consists of a standard-sized loose-leaf manual in a three-ring binder which also contains three minifloppy

disks. These disks are labelled 'Program Disk', 'Output Disk 1' and 'Output Disk 2'. The Output disks are write protected — which led to some initial confusion on my part. How do you 'output' to them? Perhaps they should have been labelled 'Data' disks, since they contain a library of indexed text from which the program selects paragraphs to compile its reports.

The manual is in four sections: User Manual, Quick Reference Guide, Fundamentals of Selling, and Customer Contact Records. Before you get to the first section there is a 'Letter from the President', a foreword by someone else, a preface, a note on how to use *The Sales Edge*, and finally a table of contents. I suspect a simple 'Read Me First' would have been a desirable alternative, since most users will want to try the program as quickly as possible.

Instead, you are enjoined to read the section 'Fundamentals of Selling' — a 51-page positive-thinking exhortation to structure your approach into a seven-point attack: Prospecting, Preparation, Opening, Presentation, Handling Objections, Closing, and Follow Up. All a bit overwhelming for the non-salesfolk amongst us, and probably old hat to professionals.

By the time you have digested this pile-driving goal-oriented oracle of wisdom, you are no closer to knowing what to do with the three disks.

If you start next with the Quick Reference Guide you'll also be sadly disappointed. It tells you what the arrow keys do, gives a brief summary of the function keys, tells how to manoeuvre through the system in non-standard ways, and how to Quit and Exit (two different things).

The secrets of booting the program are outlined in 'Getting Started', which you

discover on page 23. Since the program is copy protected, you must either install DOS on The Sales Edge disk, or boot from your own system disk then replace that disk with the Sales Edge Program Disk. I took the latter route, since I got a 'No Room for System' message when I tried the DOS command SYS B: — probably because it's designed to run under DOS 1.x (it doesn't say which version anywhere).

Nowhere could I find what to do if DOS is not installed on the Program Disk. This is a bit slack, since most naive users will try to install DOS 2.11 (or whatever), with as much success as I had. There is an AUTO-EXEC.BAT file designed to execute SE.EXE as soon as the system is booted, but no specific instructions to issue the command SE if adopting the alternative route. Too much hype, and not enough meat, was my reaction at this point.

You are also enjoined to avoid running out of disk space. The program disk is used to store profiles for you (as salesperson), plus profiles for each of your 'prospects'.

The remainder of the user manual would be better replaced with the dictum: "just load your disk in drive A, then follow the bouncing ball". The menu system is so simple, one hardly needs instructions about using it.

## Using the Program

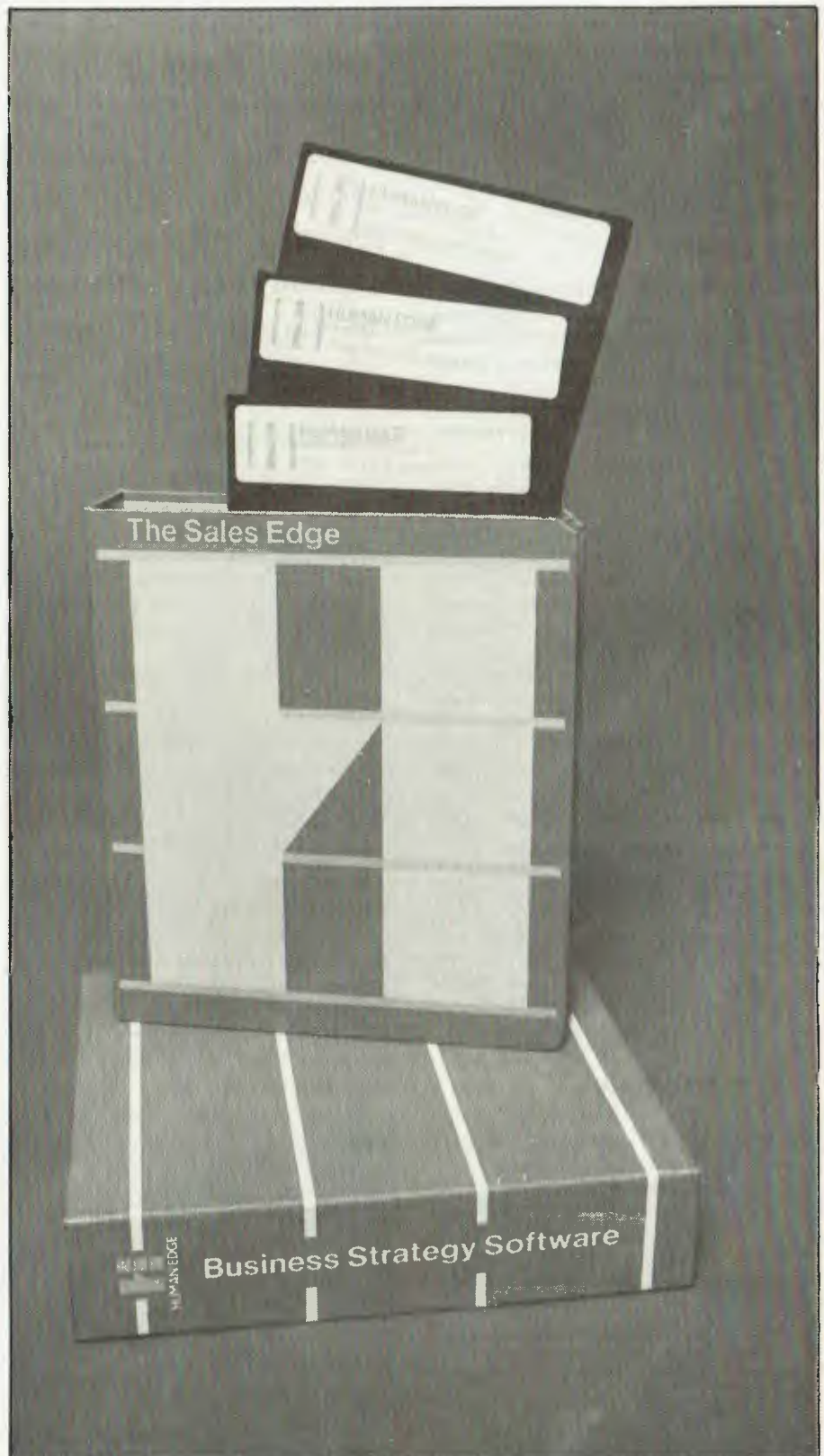
With DOS already running on Ron — my President 16-210, I tried the SE command. After about a minute and some obvious attempts to locate a track which shouldn't be there, the program suggested that I load the program disk. Blimey! It's already loaded. Clearly, the program was strangled, or the protection mechanism was kaput. Time to call for help.

A short STD call to Human Edge in Melbourne confirmed my diagnosis. The disk was fine. The problem is in the way the disk is copy-protected. It seems some PC compatibles refuse to recognise the attempt to read an illegal track. It's a question of ROM code, and does not mean that the compatible is incompatible.

Fortunately, the disk loaded just fine on the Hyperion. But it still took a full minute to load the program. It would be nice if there were some sort of comforting message on display while all the disk clicking goes on. Could be a bit unnerving for the intended non-technical audience.

The opening menu offers four numbered options:

1. Instructions
2. Assessing Yourself





## 3. Assessing Your Customer

### 4. Sales Strategy Report

Row 25 highlights three function key roles:

F1 Help F2 Function Key Roles F8 Exit

All pretty clear. Option 1 and F1 supply the same two opening help screens — quite enough to get you going.

## Assessments

If you select Option 2 (assessing yourself), you are asked if this is a new assessment, or if you wish to update a previous assessment. The first time around, the choice seems obvious.

For 60-odd statements, you are asked to agree or disagree. For example, the first assertion is "I like to take charge of situations". Another is "I am somewhat impulsive". For each, you use the arrow keys to indicate whether you agree or disagree. These assertions come from the system file ITEM.PUL, and your profile (a binary vector containing the As and Ds) is placed in the file MY.SLF. After the assessment is completed, you are given the option of saving the new profile, or of returning to the main menu, or of returning to the assessment.

It would have been neat if the program had run some sort of review on my profile. Since I entered 'agree' and 'disagree' in totally random fashion, I should surely have been urged to consult a psychiatrist. Maybe salespeople are peculiar anyway?

A similar procedure is performed for the Customer Assessment, although a set of 50 adjectives is presented, for each of which you must select Agree or Disagree. The F9 key exits the assessment. The resulting profile is held in a file with a .CUS file tag. The file name corresponds to your customer.

## Sales Strategy Report

Selection of option 4 provides an (optional) 'What to Expect', then instructs you to "insert your data diskette". This is normally the Program Disk, but you may keep your profiles on another disk if you wish. (I don't recall seeing that option when making the assessments). The message doesn't specify which drive you should insert the disk in either. My guess (drive A) was accepted.

You then specify the customer filename. The next decision you must make is whether you want the report to appear on the screen or as a hard copy. Since no special printer features are used, any printer hooked up to your parallel port (LPT1)

*The remainder of the user manual would be better replaced with the dictum: "just load your disk in drive A, then follow the bouncing ball". The menu system is so simple, one hardly needs instructions about using it.*

will do. Unfortunately, you will need to use continuous fanfold paper, since there is no 'pause to continue' between pages — an unfortunate design oversight.

You are then told to "Insert Output Disk #1" — again, no drive was specified, so we swapped with the program disk. This was a mistake — the machine tried to read drive B, which was empty. Someone goofed again.

With the output disk in drive B the customised report began to appear on the screen. Pressing the space bar reveals the next page. Unfortunately you must swap the output disks a few times (always using drive B) during the process. This is true also for hard copy reports.

Disk swapping is required as the program retrieves skeletal paragraphs in order to build sections of the report. These paragraphs contain 'pseudo-variables' (like %1 and %2), which are replaced with forms of the customer's name. Unfortunately this clobbers the neat right-justification of the original paragraphs whenever the substitution is made.

After entering a reasonable pair of profiles, I obtained a five-page printed report containing the following major sections:

- What to Expect
- How to Succeed
- Customer-specific opening strategies
- Customer-specific presentation strategies
- Customer-specific closing strategies

As an example of the report style, the following excerpt is from the section entitled 'What to Expect'.

*"Mr. K. G. is the type of person who works best alone, so keep your meeting relatively private. Make a minimum of social demands on him. Control and monitor your tendency to be kind and caring around this person. These normally positive feelings may worry this person and cause him to withdraw, leaving both of you uncomfortable."*

And this is from the final section:

*"Mr. K. G. seeks a high level of arousal. He will probably respond well to inducements. Because Mr. K. G. can be so difficult to work with, offering bonuses and incentives to him may be needed to get him to pay attention to you. Use the 'Limited Offer' close to get his attention, and as a way of taking advantage of his impulsiveness."*

## In Summary

How valid these reports are should best be judged by a qualified psychologist. My layman's reaction is that the one serious report which I generated was quite consistent with the characteristics of both parties. It was well-structured common sense, tailored for a specific situation. □

<b>Product name:</b>	The Sales Edge
<b>Hardware required:</b>	IBM PC or compatible
<b>Operating system:</b>	PC-DOS or MS-DOS
<b>Author:</b>	Dr R.A. Warren
<b>Stable:</b>	Human Edge Software Corporation, 2445 Faber Place, Palo Alto CA 94303, USA.
<b>Distributor:</b>	Human Edge Software Corp. PO Box 33, South Melbourne 3205; (03) 690 5014.
<b>Price:</b>	\$495
<b>Primary function:</b>	Creating reports to guide salespersons in specific selling situations.
<b>Best points:</b>	Simple to use; simple concept.
<b>Worst points:</b>	Too much hype; incomplete instructions.



## HEXADECIMAL PURSUIT

*Thanks to the rate with which the computer industry changes, Les Bell was fast coming to the conclusion that his hard-won expertise was even more rapidly becoming trivial and irrelevant. Thanks to recent developments, however, he has found that being trivial and irrelevant is the key to success.*

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All the answers are given on page 56, so there's no need to suffer purgatory because you can't find the answer to one particular question even though you know it ... It's on the tip of your tongue ... What was it? ... Oh hell, we were talking about it only last week ...

So, what's the competition, I hear you ask. Well, as you probably know, copyright is very important to trivia buffs. There are only so many trivial facts in the world, and it's very important to establish ownership: "These are my trivia and you can't play with them." So they can tell where other quizmasters are getting their questions from, the true trivia masters always give a few wrong answers to their questions.

I've done the same thing here. In the answers to these questions, there is one deliberate (honest) wrong answer. Tell us which one it is, and the correct answer, on the outside back of a sealed envelope, and the first correct answer picked out of a hat on October 31 wins

Charlie's Cashbook.

### The Questions

1. In what year was the last Univac II computer taken out of service?
2. What was the word length of the Digital Equipment Corp PDP-8, in bits?
3. What do JOVIAL, SNOBOL, and BLISS have in common?
4. Who was Ada named for?
5. Which US electronics magazine published the first design for a hobby computer, and what was it called?
6. Who was the principal designer of the FORTRAN programming language?
7. What was the original, and full, title of Dr. Dobbs' Journal?
8. Which computer company tried to sell a kitchen computer through the mail-order catalogue of the Texas department store, Neiman-Marcus?
9. The early Apple IIs had a built-in, pseudo-sixteen-bit processor emulation. What was it called?
10. Who sold a computer called the Kim?



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# TRIVIA

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11. What was an ETI 630?
12. What does CP/M actually stand for?
13. What was the name of the Albuquerque, New Mexico, company which produced the Altair, the first popular kit computer?
14. What was the name of dBase II before it became dBase II?
15. What are the names of the two Harvard MBAs who wrote Visicalc?
16. What program, originally written by Tim Patterson, has become one of the most popular in the world today?
17. Who designed the VDM-1?
18. Who should win a Nobel Prize for programming for having written Microsoft's Flight Simulator?
19. What is Lisa supposed to stand for, but probably doesn't?
20. What is the official model number of the IBM PC/XT?
21. Commodore's first computer was called the PET. What does PET stand for?
22. Bob Harp has started two personal computer companies in the US. What are they?
23. Everyone knows that BASIC is a language, but what does BASIC stand for?
24. What was *Your Computer's* first Personal Computer of the Year?
25. The Christensen protocol sounds like a good name for a spy thriller. What is it?
26. Before starting Osborne Computer Corporation, Adam Osborne was most famous for his monthly magazine column, 'From the Fountainhead'. In which magazine did it appear?
27. UK electronics guru Sir Clive Sinclair's latest small computer is called the QL. What does QL stand for?
28. Who wrote the original Texas Tiny BASIC in Volume I, Number I of *Doctor Dobb's Journal*?
29. What kinds of computer were used (for real, not the fake ones) behind the scenes in the movie *War Games* to drive the 120 battle plan monitors in the control room?
30. How much memory did the base model of the original Altair computer have?
31. Who developed the 4004, the first four-bit microprocessor?
32. In what year was IBM Australia incorporated?
33. Which major computer company sponsored the publication of *What To Do After You Hit Return*, a collection of computer games from the People's Computer Company?
34. Who built the 'Cream Soda Computer'?
35. The first word processing program for microcomputers was called 'Electric Pencil'. Who wrote it?
36. Before writing CP/M, Gary Kildall produced a language called PL/M for Intel Corporation. On what earlier language is PL/M based?
37. What did Steve Jobs sell to pay for the start-up of Apple Computer?
38. The Macintosh computer makes extensive use of a graphics subroutine library called QuickDraw. Who wrote it?
39. The principal architect of Lotus 1-2-3 had earlier written Visi-trend/plot for Visicorp. What is his name?
40. IBM's 5100, an early ancestor of the PC, ran two languages. One was BASIC, what was the other?
41. What was the first application, indeed the official *raison d'être*, for the Unix operating system?
42. Who had the temerity to write a programming textbook in which all the examples of bad programming are taken from other people's programming textbooks?
43. Which computer company indirectly started the microcomputer revolution by requesting Intel's development of the 8008 chip?
44. Which Australian company has now produced over 50,000 computers?
45. In what year did IBM release its revolutionary new computer, the System/360?
46. Who started a computer company called Thinker Toys?
47. How many pins were there on the Altair bus?
48. What was the model number of Hewlett-Packard's first pocket programmable calculator?
49. Where was mouse-driven software pioneered?
50. Who wrote the original Adventure game?
51. How did Dr An Wang make the money to start Wang Laboratories?
52. What was the computer, the design of which was described in the Pulitzer Prize-winning book, *The Soul of a New Machine*?
53. Who started up the world's first bulletin board system, on behalf of which computer club?
54. The C language is only one of a line of similar languages. What was its predecessor at Bell Labs called, and what is the name of its successor?
55. Who said "What people want is a home computer that does windows"?
56. What did Wayne Ratliff do that made him rich?
57. The inventor of Boolean Algebra, the mathematical logic system upon which computers are ultimately based, was obviously an erudite, clear and logical thinker. But what nationality was George Boole?
58. How many different instructions can the Z80 microprocessor execute?
59. How many disk drives can MS-DOS support?
60. Whose idea was the Dynabook project?
61. How serious is a page fault on a computer — not a problem, it will crash eventually, it will crash immediately, or it will catch fire?
62. What is the MS-DOS country code for Australia?
63. On the Apple I computer, what was the function of the small optional board that stood vertically at one end of the main board?
64. Who was the co-author, with Niklaus Wirth, of the *Pascal Users' Manual and Report*?

## TRIVIA ANSWERS

1. Sperry Rand started making the Universal Automatic Computer Model II in 1958. It had over 5000 vacuum tubes, was water cooled and the CPU, which was 9 feet high, 10 feet wide and 14 feet long, could add two numbers together in 140 microseconds. The last one was retired from Computer Data Corporation, a Californian service bureau, in March 1978.
2. Despite the model number, the PDP-8 was a 12-bit computer.
3. All three are computer languages.
4. Augusta Ada Lovelace, daughter of Lord Byron, was a sponsor of Charles Babbage in his attempts to build an Analytical Engine. While she has been credited with having written the first computer program for this (hypothetical) machine, it now appears that the paper in which this 'program' appears was written by Babbage and only published under her name to lend credibility.
5. *Radio-Electronics* magazine published the design of the Mark 8 computer, based on the 8008 processor, in July 1974.
6. FORTRAN (FORmula TRANslator) was principally the creation of John Backus, an IBM researcher. Development of FORTRAN I was started in 1954, as part of the development of the IBM 704 compu-▶

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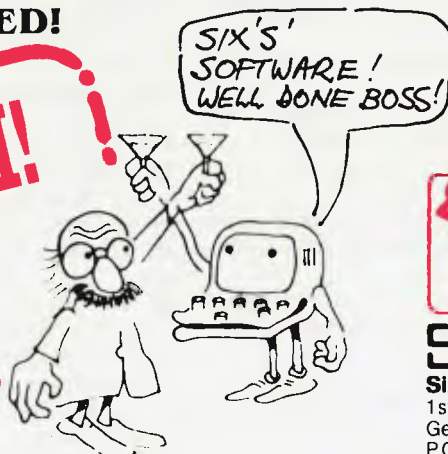
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# TRIVIA QUIZ ANSWERS

ter, and completed in 1957.

7. When it first appeared, *Dr Dobbs's* was known as *Dr Dobbs's Journal of Tiny BASIC Computer Calisthenics and Orthodontia, or Running Light Without Overbyte*. It was principally dedicated to the creation of a Tiny BASIC interpreter which would run in less than 2 Kbytes of memory.

8. Honeywell produced a kitchen computer which sold for around \$10,000 in 1970, and in the process became the first company to prove there is no market for home computers.

9. This small interpreter for a hypothetical sixteen-bit machine ode was called Sweet Sixteen.

10. The Kim-I was an evaluation kit for the 6502 microprocessor and was manufactured by MOS Technology, which was later taken over by Commodore.

11. The ETI 630 was an early (1976) video display terminal, designed by Barry Wilkinson at *Electronics Today International* (a sister magazine of YC) and supplied in kit form by Applied Technology.

12. CP/M stands for Control Program for Microcomputers.

13. The Altair was produced by MITS Inc, which stands for Micro Instrumentation and Telemetry Systems.

14. dBase II was originally called Vulcan.

15. The number-crunching exercises at Harvard Business School gave Dan Bricklin and Bob Frankston the idea for Visicalc.

16. While working for Seattle Computer Products and waiting for the release of CP/M-86, Tim Patterson wrote his own operating system, then called QDOS (Quick and Dirty Operating System) which Microsoft later upgraded to MS-DOS.

17. The VDM-1 was the first S100 bus video board. Marketed by Processor Technology, it was designed by Lee Felsenstein.

18. Bruce Artwick of Sublogic originally wrote Flight Simulator for the Apple II, later for the TRS-80 and IBM PC. Microsoft supplies the IBM version.

19. According to Apple, Lisa stands for Local Integrated Software Architecture. The more popular theory is that Lisa is his daughter's name.

20. The XT is an IBM 5160.

21. PET stands for Personal Electronic Transactor.

22. Bob and Lori Harp started Vector Graphics in 1977. When they parted, Lori kept the company. Bob then set up Corona, originally manufacturing hard disks for the IBM PC, later compatible computers.

23. BASIC is an acronym for Beginner's All-purpose Symbolic Instruction Code.

24. The first winner of the *Your Computer* Personal Computer of the Year Award was the NEC APC.

25. The Christensen protocol is a method of transferring files between computers, particularly bulletin board systems.

26. Adam Osborne's monthly column was in *Interface Age*.

27. The QL is supposed to be a Quantum Leap.

28. Texas Tiny BASIC was originally written by Dick Whipple and John Arnold. Interestingly, it grew into Microworld BASIC for the Microbee.

29. All 120 displays in the room are driven by two Compupro System 8/16 computers, just like the ones we use here at *Your Computer* magazine.

30. The Altair was first supplied with 256 bytes of memory.

31. The man who developed the 4004, back in 1969, was Dr Marcian E (Ted) Hoff.

32. IBM Australia was established in 1932.

33. The coffee-table format paperback of *What to Do After You Hit Return* was sponsored by Hewlett-Packard. It even had a Hewlett-

Packard part number.

34. Back in 1971, Steve Wozniak and Bill Fernandez built a simple computer out of reject parts. It was called the 'Cream Soda Computer'.

35. Electric Pencil was the brainchild of Michael Shroyer.

36. Despite the similarity in name, and in overall structure, PL/M is not based on PL/I. It is instead based on XPL, a compiler-writing language.

37. Steve Jobs raised his seed capital by selling his VW Microbus.

38. Quickdraw was written by Bill Atkinson, who also wrote Macpaint, which relies heavily upon Quickdraw.

39. The man behind Lotus 1-2-3 is Mitch Kapor.

40. The IBM 5100 desktop computer ran BASIC and APL (A Programming Language).

41. The original excuse for the development of Unix was to support a multi-terminal word processing set-up for Bell Labs' patent applications office.

42. Brian Kernighan and Bill Plauger, whose book, *The Elements of Programming Style*, contains some lovely examples of bad programming.

43. Computer Terminal Corporation, which later became Datapoint, commissioned the 8008 chip design.

44. Applied Technology has manufactured over 50,000 Microbees.

45. The System/360 was announced in 1964.

46. George Morrow's company has at times been called Morrow's Microstuff, Thinker Toys and Morrow Designs.

47. The Altair bus, which later became the S100 bus, had 100 pins.

48. The HP-65 had 100 steps of program memory and a magnetic card reader.

49. The mouse was pioneered at XPARC — Xerox Palo Alto Research Centre.

50. The original Adventure was written in FORTRAN by Larry Crowther and Don Woods.

51. He picked up royalties on his patent on the ferrite core memory from IBM and other computer companies.

52. The machine was the Data General MV/8000, a large mini.

53. The first bulletin board was started by Ward Christensen and Randy Suess, on behalf of CACHE, the Chicago Area Computer Hobbyists' Exchange.

54. The language before C was B, and the one after is called C++ (Don't worry, it's an in joke.)

55. Esther Dyson, President of Edventure Holdings, commenting on the declining home computer market.

56. He invented dBase II. When Ashton-Tate bought out the full rights to the program, it was for forty million dollars' worth of stock options.

57. George Boole was an Irishman.

58. In early advertising for the Z80, Zilog made much of the fact that it had 158 different instructions against the Intel 8080's 78.

59. MS-DOS 2.0 and later can theoretically cope with 64 drives. They are lettered from A to Z and onward through the ASCII character set.

60. The Dynabook project, to produce a general-purpose personal computer the size and shape of a book, was the idea of Alan Kay when he was principal scientist at XPARC.

61. A page fault is usually no problem at all — it just indicates that a program wants an area of virtual memory to be loaded from disk since it is not yet in main memory.

62. 61

63. It was the optional cassette interface.

64. Kathleen Jensen.

□

# Plus/4

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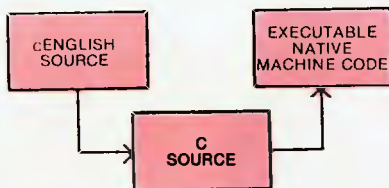
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# cENGLISH. The C Generation Language.

**What is cENGLISH?** cENGLISH is a comprehensive fourth generation procedural language based on dBASE II syntax. It is portable to a wide range of micros and minis. The language features user-transparent interfaces to a wide range of popular C compilers, operating systems, and data base managers.

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## SAMPLE cENGLISH PROGRAM

### IDENTIFICATIONS

```

MODULE Mininame
AUTHOR: bcs
DATE: 8/29/84
REMARKS: Sample cENGLISH program that adds first
names to a file
END IDENTIFICATIONS
  
```

### GLOBALS

```

FIXED LENGTH 1 ans
FIXED LENGTH 15 Fname
END GLOBALS
  
```

### MAIN PROGRAM

```

BEGIN
CLEAR SCREEN
SET ECHO OFF

USE "NAMES"
VIEW BY "ID..FNAME" ASCENDING
  
```

```

AT 23, 1 SAY "Add a record? Y or N"
AT 23, 25 ENTER ans USING "!"
  
```

```

WHILE ans EQ "Y"
CLEAR GETS
AT 6, 1 SAY "Enter first name"
AT 6, 20 GET Fname
READ SCREEN
  
```

```

INSERT
Fname = Fname
END INSERT
  
```

```

AT 12, 10 SAY "Welcome to cENGLISH", & Fname
WAIT
AT 14, 10 SAY "HIT ANY KEY TO CONTINUE"
STORE " " TO ans
STORE " " TO Fname
AT 23, 1 SAY "Add another record? Y or N"
AT 23, 30 ENTER ans USING "!"
CLEAR ROW 1 THRU 23
  
```

```

END WHILE
  
```

```

AT 12, 10 SAY "That's all for now!"
UNUSE "NAMES"
SET ECHO ON
  
```

```

END PROGRAM
  
```

I'd like to know more about cENGLISH.  
Please send further information.

Your Name \_\_\_\_\_

Company \_\_\_\_\_

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Title \_\_\_\_\_

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## PROGRAMMER'S WORKBENCH

### Greyscale Adaptor

Geoff Cohen of RC Electronics in Canberra, well-known to many of our readers as a hardware guru (particularly for his support of the Osborne I and previously the Ohio Scientific machines), has designed a variety of hardware and software add-ons, including the 80-column card for the Osborne.

Geoff recently dropped in to show me his latest creation, the PC Greyscale Adaptor. He had correctly identified a major problem encountered when using monochrome displays with the IBM colour/graphics adaptor board: any colour areas of the screen come out as illegible, striped areas. This means programs like Sidekick and Topview are unusable with a monochrome monitor.

That's a pity, because many heavy users

*This month Les Bell  
surrenders his  
rose-coloured view of life in  
favour of a greyscale  
adaptor, and fails to cure  
the turkey-like tendencies  
of dBase. Where the  
dBase with the chicken  
fetish comes from, Akhurst  
only knows.*

(like word processor operators) find a green or amber screen much easier on the eyes than a colour display, which is a bit blurry in comparison — but they can't use many programs.

It's even worse for users of the IBM Portable PC, which uses a yellow screen driven by the colour card. PPC owners can't use Sidekick or Topview unless they cart a colour display around with them.

Geoff solved this problem with his circuit, which is essentially a high-speed D/A (digital/analogue) converter. Instead of the bars which would otherwise appear on a monochrome display, the box turns the colour signals into a grey scale. Colour displays suddenly become legible. Topview will work, and bleary eyes feel much better.

Despite his work with the PC, Geoff has ►



\* INKEY.CMD - Equivalent to BASIC's INKEY\$ function  
\* Written by Les Bell, 7/2/85

```
POKE 65280,83,177,11,205,224,11,192,91,116,9,83,177,1,205,224,91,67,136,7,195
SET CALL TO 65280
STORE CHR(0) TO mstatus
CALL mstatus
```

Listing 1. INKEY Program for CP/M-86.

\* INKEY.CMD - Equivalent to BASIC's INKEY\$ function  
\* Written by Les Bell, 7/2/85

```
POKE 41984,200,14,11,205,5,0,183,225,200,229,14,1,205,5,0,225,35,119,201
SET CALL TO 41984
STORE CHR(0) TO mstatus
CALL mstatus
```

Listing 4. CP/M-80 version of the INKEY program. Note: this version is untested, but should work.

not forgotten Osborne users. His other new product, Viasoft, is a videotex terminal emulator for Osbornes, Kaypros, Bondwell 14s and other 8-bit CP/M machines. It will run on any machine which has chunky graphics, with suitable adaptation by Geoff. It's good to see someone has remembered the thousands of CP/M machines out there.

## Gobble, Gobble

Most dBase users have their own private wish lists. Many, for example, wish there was an ON ERROR statement, which would allow a program to automatically correct corrupted indexes. Recently, Norman Wheeler, a member of the dBase User Group, posed an interesting problem: "Generate a command that has been in BASIC for years and which ought to be in dBase II.

"A report program," he continued, "as opposed to a report produced by dBase II's report generator, is a loop process, but with ESCAPE off there is no ready means of terminating it. A simple WAIT TO inside the loop means long reports require constant keyboard attention — hardly suitable for overnight printing.

"BASIC solved the problem with the KEYS or INKEY\$ command. Any clues on how this might be achieved in dBase II?"

Vell, Norman, I haf some goot news and

some bat news. It struck me as obvious that a short assembler subroutine would fix the problem, so I wrote one. This subroutine, which is called INKEY.PRГ (or .CMD), simply uses the CP/M BDOS calls to test the keyboard status and see if a character is there. If there is, it's read and returned in the character memvar MSTATUS.

All very straightforward, and if there were any justice in this world it would work. It does — after a fashion. That's the good news.

The bad news is that dBase II has a nasty habit of polling the keyboard to see if a key has been struck while running a command file. If it has, it gobbles it up and the keystroke disappears forever.

Thus, if you run the INKEY program (even if you strike a key) the chances are dBase will gobble the keystroke first, and

the INKEY assembly routine will never realise a key has been struck. If you have a keyboard with auto-repeating or 'typematic' keys, holding a key down so a stream of characters is sent to dBase means INKEY will eventually get one of them and return it to the calling program.

I've tested the CP/M-86 version under Concurrent CP/M-816 on Cassius (our office Compupro) and it worked fine, or at least as well as could be expected. The CP/M-80 version should work okay, but because of a bug in the CP/M-80 emulation of Concurrent CP/M-816 I wasn't able to prove it, and it was just too much effort to drag Brutus (our 8080 system) out of retirement. As for an MS-DOS version, just copy the outline of the CP/M-86 version and change the BDOS calls.

I've had a good look at the keyboard input routines of CP/M-86 dBase 2.41, and it's one of the hairiest codes I've seen in a long time. It causes those of us who run dBase II on multi-user systems particular anguish because its perpetual polling of the keyboard, even when no character is ready, uses up CPU cycles to no avail and slows the system down. I haven't been able to fix that problem, so it's unlikely I'll be able to stop dBase gobbling characters wanted elsewhere.

Which reminds me, did you hear the one about the chicken that got loose and accidentally strayed into a turkey farm? After wandering around for a few days ... (Editor's note: In the interests of public morality, we'll leave Bell to his obscene dBase-induced ramblings.)

## Mentioned in this article:

RC Electronics, 72 Spofforth Street, Holt 2615; phone (062) 54 7608.

## Glossary:

**Digital/analogue converter:** A special circuit which converts a binary number presented to its input into the corresponding voltage at its output. Commonly found in industrial control systems, electronic music synthesisers and the like.

**Grey scale:** A range of grey shades from black to white, commonly used instead of colour in some high-resolution graphics systems. □

```
STORE t TO more
DO WHILE more
  ? 'Dummy report line'
  DO inkey
  IF mstatus = ' '
    STORE f TO more
  ENDF
ENDDO
? "That's all, folks!"
Listing 2. This test program shows how to use INKEY.
```

; inkey.asm - dBASE II equivalent for BASIC's INKEY\$ function  
; written by Les Bell, 7/2/85  
; Version for CP/M-80

```
bdos equ 0005h
c$read equ 01h
c$stat equ 0bh

org 0A000h

inkey:
  push h ; save pointer to memvar
  mvi c,c$stat
  call bdos
  ora a
  pop h
  rz ; if no char ready, return
  push h
  mvi c,c$read
  call bdos ; otherwise, read it
  pop h
  inx h ; point to first char after length byte
  mov m,a ; store incoming char there
  ret
```

Listing 3. CP/M-80 version of the INKEY assembler routine. Note: this version is untested, but should work.

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## TOSHIBA MSX HX-10

THE TOSHIBA HX-10 was the first MSX machine to hit the Australian market, although MSX computers have been readily available in Japan since late last year. Others are marketed here by Sony, Yamaha and Mitsubishi.

The MSX standard was announced by Microsoft in 1983. A detailed hardware and software standard based on the Z80, it requires Microsoft BASIC in ROM (32 Kbytes), a standard cassette interface, and a standard ROM cartridge interface. All MSX machines have 256 by 192 pixel colour graphics and 24 by 40 character displays. Most offer an RF TV output to suit local TV frequency standards, and some include composite video outputs. There is also a standard 8-bit parallel Centronics output for printers and plotters.

By late 1984 there were over a dozen MSX machines on the Japanese market; Japan has seen the emerging dominance of the MSX standard over that of the IBM PC, which has yet to take hold in that country. Other MSX manufacturers include Canon, Casio, Daewoo, Hitachi, Mitsubishi, Panasonic, Pioneer, Sanyo, and Sony. MSX cartridges and cassettes are interchangeable between these machines.

Before MSX machines can make a serious impact on the United States and Australian markets, there will be a need for these manufacturers to include the MSX

*Still in last month's  
cheapskate vein, Frank  
Lee considers the Toshiba  
HX-10, the first MSX  
machine to hit the  
Australian market.*

9cm disk drive as standard. Microsoft has an MS-DOS-like operating system called MSX-DOS, which it claims will also suit many currently available CP/M programs.

Toshiba is one of the few offering this drive. With a capacity of 360 Kbytes, this 'Soon To Be Released' device will plug into the HX-10's ROM cartridge socket; it is understood up to two such drives can be attached in tandem. At the time of writing, Toshiba advised users to purchase the MSX drive from Sony pending arrival of Toshiba stocks — quite a testimony to the value of the MSX standard. The Sony drive costs \$529.

#### Not Just a Computer ...

The HX-10 is more of a system than a computer. Peripherals include the disk drives, a dot matrix printer — or a 'printer/

plotter', joysticks, cassette data recorder, acoustic coupler, and an expansion port expander.

The documentation is good, but not brilliant; at least it's surprisingly devoid of Japlish. There are two manuals: a 50-page Owner's Manual, and a 150-page MSX BASIC Reference Manual. Both are printed as paperbacks and are adequate for what is needed by both the casual user and determined programmer.

The computer itself is in a handsome shiny black plastic cabinet weighing in at just on 2.5 kg — not too light to be flimsy, and not too heavy to be carted around in hand luggage. It measures 36 cm by 24 cm and is 6 cm deep. The keyboard is full size, and the keys have a full travel; a trained secretary should have little difficulty using it, although this is not what the machine is primarily intended for.

In addition to the regular qwerty layout, there is a cursor control pad with four arrows, and separate keys for INS, DEL, HOME and SELECT. A big red STOP switch lets you pause program execution (important if nature calls while you're zapping the Alien Invaders). There are five function keys which have alternative uses if the SHIFT key is also pressed. GRAPH and CODE keys greatly multiply the symbols which may be typed (there is a total of 255!). ▶



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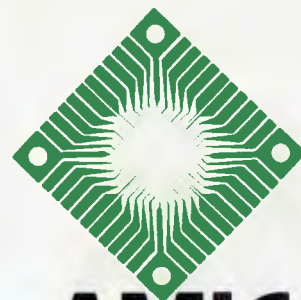
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standard cartridge slot which can also act as the interface to the disk drives. A spring-loaded protective flap prevents nasties like hairpins or paperclips from dropping into the works.

The power switch is on the left side of the unit, which contains an integral isolated power supply. The power cord plugs directly into the 240 V mains.

On the right side are two nine-pin joystick sockets and the 14-pin parallel port socket. A cable is included to interface from the computer to a standard Centronics-type device.

The rear of the computer sports an expansion bus connector protected by a removable metal cover. An eight-pin DIN connector is labelled 'cassette recorder', and three RCA connectors as 'video', 'audio' and 'RF'. The latter socket connects to your TV receiver, which must be tuned to UHF channel 36. Care must be taken to avoid picture distortion due to EMI (electromagnetic interference). This generally involves positioning the cables to minimise the problem. When correctly adjusted, the picture quality is excellent.

## Not Meant for Business

Since the primary marketing thrust for the MSX machines is towards home entertainment and education, the main storage medium is the audio cassette. Toshiba provides a regular battery-operated cassette drive for \$75. The computer controls the drive motor, and programs are loaded either by the bare CLOAD command, or a specific CLOAD which nominates the required file. As usual, tape loading is very slow. On the other hand, this particular unit gave absolutely no trouble at all — even though I set the volume control at a random midway position.

Three sample programs were included. One was a standard demonstration tape containing five programs, all of them illustrating the sound and graphics capabilities of the HX-10. Although there is a separate audio signal available from the computer, excellent sound is produced by the TV receiver's regular audio channel. The sound source is the popular programmable sound generator chip from GI — the AY-3-8910, which has three separate channels. MSX BASIC is equipped with statements designed to use this chip to its maximum.

Two game cassettes were also enclosed. One is a three-dimensional chess game written in BASIC. It is colourful, but somewhat sluggish in execution. By contrast,

*Before MSX machines can make a serious impact on the US and Australian markets, there will be a need for these manufacturers to include the MSX 9 cm disk drive as standard.*

the pinball game (a binary program) runs like greased lightning — almost as fast as it does on a 6502-based machine. Incidentally, you load binary programs with BLOAD (not CLOAD).

I was disappointed to discover another cassette containing a chart maker (called TPlan), an excellent test for the printer/plotter, was missing from the consignment. "Problems with customs" were the reason, a spokesman explained. That's sad, because I would love to have seen it produce a bar chart for these pages. TPlan will retail for \$69.

The manual for the printer/plotter contained all the instructions necessary for using the device under the control of BASIC; it's written in good clear English.

Since the device hooks to the machine with a standard Centronics interface, I tried a few tricks with it on Ron, my tame President 16-210. It handles the shifted PrtSc key correctly by sending the entire screen to the plotter, but IBM graphics characters are turned into something else because of the MSX coding.

The printer/plotter has four pen colours: black, red, green and blue. It accepts continuous roll paper, or single sheets up to A4 in size. Although relatively slow, it could easily double as a printer.

The HX-P550 dot matrix printer is similar in appearance to the C Itoh 80-column printer; in fact, it uses the same printhead and ribbon cartridge. But there the similarities end. The escape codes for the P550 are strictly MSX, and these are nothing like the IBM, C Itoh or Star escape codes. It's a nifty little printer, but a wee bit pricy for what you get. The problem is that none of the others follows the MSX standard. No doubt time will rectify that position — or maybe Microsoft will supply a suitable MSX printer driver for MS-DOS.

The manual for the P550 is a real laplish essay. How about:

"As the Extended CG code, when the invalid code is specified, it becomes an error and the previous Extended data is valid, then the subsequent data is printed as the print data." (Page 39).

Got all that clear?

□

RATINGS:	POOR	GOOD	V.GOOD	EXCELLENT
DOCUMENTATION	<div></div>			
EASE OF USE	<div></div>			
SPEED	<div></div>			
FUNCTIONALITY	<div></div>			
VALUE FOR MONEY	<div></div>			

## PRODUCT DETAILS

Manufacturer:  
Distributor:

Prices (incl. tax):

Toshiba Corp, Tokyo, Japan  
Toshiba (Australia), 84-92 Talavera Road,  
North Ryde 2113. (02) 887-3322.  
Basic machine: \$499  
Dot matrix printer: \$559  
Printer/Plotter: \$399  
9 cm disk drive: \$529  
Joystick: \$20



# COMMODORE HEAVEN

No games but everything else stocked at discount prices. We directly import 100 different lines and also deal with all the usual warehouses. Let us show you how your 64 can become a powerful business machine.

We normally have about a dozen different printers. 15 or so word processors, 20 or more spreadsheets and databases and about the same number of accounting systems.

**64 ACCOUNTING PACKAGE (TOTL's newest) . . . \$159**  
TOTL's newest lightning fast machine language version (new in May 1985) includes stock control and printing of invoices and statements. Dates, postcodes, etc. selectable for Australia or US. All programs load from a master menu. Balance-forward system. Invoices allow both taxable and non-taxable items and screen prompts and printed output headings can be customized to fit any business. This and the Taihao disk drive make your 64 a powerful business machine available.

**64 TOTL GENERAL LEDGER . . . \$99**  
Does the whole of your final accounts. If you're using the TOTL accounting Package, it automatically draws data from there.

**TOTLWRITER d/base + word processor . . . \$99**  
Integrated word processing plus database with 10 user defined fields plus expandable spelling checker. Live screen editing, auto word wrap, global search or search and replace, set tabs like a typewriter and many other features. HELP menus make it easy to use even though it's the most powerful C64/128 word processor

**TOTL INFOMASTER database . . . \$99**  
RUN magazine says "best of all." Dynamic record and field definitions, 10 files per diskette, records up to 2500 characters long, fields up to 245 characters, up to 100 fields per record with repeating fields. You can define your own report format with sorted and selected records. Uses all makes of printers.

**SUPERBASE 64 (Enhanced version) . . . \$169**  
Just arrived. The newest improvement to this popular British program. With audio learning cassette. Up to 1,000 characters per record on up to four screens and up to 128 items per record in files of up to 16,000 characters.

**STEPPING STONES FOR Superbase . . . \$29 each**  
Formats your Superbase. Accountants' Time Recording; Sales & Purchases Daybook; Cashbook; Stock Records; Solicitors' Time Recording; Travel Agents; Estate Agents.

**AUTOCALC 64 spreadsheet . . . Disk \$59, Tape \$55**  
Suitable for any application involving extensive manipulation of data and formulae, from financial planning to investment analysis, from market research to sales forecasting, from scientific or engineering calculations to technical analysis. Copes easily with trigonometrical functions, paranthesis and Boolean logic as well as totalling and averaging and accepts complex conditional statements. You can choose column width or number of rows, numerical format, etc. to suit your purpose. 2,000 cells. Full replicate facility. Data can be SAVED or printed out. Comprehensive instructions plus practical demonstration program. Easily best value-for-money.

**664-name GENEALOGICAL PROGRAM . . . Disk \$85**  
Produces 4, 5 and 6-generation family record charts to the printer or 4-generation charts to the screen. Fully indexed and with easy screen editing. 664 names, plus notes on each person, fit on each disk and several disks may be used.

**ANIMAL PEDIGREE PROGRAM . . . Disk \$135**  
Produces 4 or 5 generation pedigree charts, ownerships, mating, breeding, shows and awards records with full indexing and easy screen editing. Search function allows easy access. (IBM and Apple versions available soon.)

**TAIHAO Commodore/Apple DRIVES . . . \$495**  
Top quality all metal disk drives that will run BOTH Apple and Commodore disks. Complete with all plugs and 20-line parallel cables to connect to all plugs to your C64 or C128. Switches let you choose Device No. 6 or 9 and Normal. Write Protect or Override Write Protect. Single drive expandable to double with additional drive. Regulated 240 volt 50Hz power supply. Serviced Australia wide by Hills.

**SFD1001 CBM 1,000,000 BYTE DRIVE with i/face. . \$799**  
Commodore's famous IEEE drive, stores 1 megabyte on an ordinary 5 1/4 in floppy. Loads and saves at six times the speed of a 1541. Complete with IEEE Quicksilver interface that doesn't use any computer memory and has cartridge port and cable with IEEE-488 connector

BUSICALC 1 \$59, Busicalc 2 \$75, Busicalc 3 \$99	LETTER WRITER	Tape \$27, Disk \$29
MAGPIE famous British database, new for C64	TOTL MAILING LIST/LABEL	Disk/Tape \$45
dialog 8FM DATABASE	THE MAILER	Disk \$48
dialog DATABASE + MAIL LABEL	EASY MAIL by Commodore	\$69
dialog TRANSACT book keeping system	CHARTIST Stocks & Shares prints graphs	\$149
dialog INVSSTAT invoices and statements	CHARTPAK 84	\$99
dialog STOCK-AID stock control inventory	COMPUTER STOCKS AND BONDS	Tape \$39
TOTL TEXT Enhanced	COMMBORRE'S EASY CALC	\$85
TOTL SPELLER works with EasyScript, Bank Street	HES TIME/MONEY MANAGER	\$55
FLEET Fast, 40, 88, calc.	TOTL Time Management rated 4 stars	(VIC \$45) \$29
HESWRITER	TOTL Home Accounting	\$58
INSTA WRITER	CONTINENTAL Home Accounts	\$79
SOFTSMITH	ABRACALC HOME MANAGER + SPREADSHEET	\$37
EASYSRIPT 64	PERSONAL ACCOUNTANT	\$34
8MINIWRITER/DMINISPELL	CASH CONTROLLER	\$24
QUICK BROWN FOX	EXPENSE MANAGER	\$19
TOTL KEYWORD CROSS REFERENCE	PRICES CORRECT 3/8/85	\$45

SOFTWARE will be exchanged for the same title if faulty. Some of the newer programs may self-destruct if any attempt is made to copy them and NO exchange will be made in those circumstances.

Freight, packing, etc is \$3 per order, irrespective of weight or destination. BANKCARD MASTERCARD VISA ACCEPTED.

**TO ORDER, SIMPLY PHONE  
(03) 700 2451**

YC 9/85

## 1200/1200 and VIATEL acoustic coupler . . . \$199

With RS232 interface and software for Commodore, BBC, Amstrad or Spectrum included, Telecom approved both here and UK.

## AUTO DIAL, AUTO ANSWER MODEM 300 baud . . . \$199

With VIP terminal (usually \$99 from Commodore) included FREE! Not Viatel. Full half duplex. Plugs into User Port of your C64, C128 or VIC 20 and draws its power from there. Direct connect to the phone service. This and Compute's Gazette program lets you run your own Bulletin Board. 300 baud.

## 300/300 and 1200/75 modem ACME . . . \$299

Direct connect. Plugs into User Port of your 64 and draws its power from there. (Adaptors for other computers available). Includes 3 months sub to STARS encyclopedia and 6 weeks sub to MICRO 666 (Commodore database). Cartridge software (Australian made and best of all) gives instant access/ \$79 unit Acme Modem.

## SENDATA direct connect modem 300+1200/75. . . \$299

Connects directly to your phone socket and has its own handset. Plugs straight into your 64 and does not need connecting cables. Software included FREE!

## OLYMPIA NLQ 160 cps dot matrix printer . . . \$599

## EPSON NLQ PRINTER with Commodore i/face . . \$475

## GEMINI work alike PRINTER (proportional lettering). \$450

All the features of the famous Gemini PLUS lots more graphics and proportional spacing. It's 1,400 words per minute (almost 11% faster than the Gemini which now sells for \$260 more). Commodore, Apple, IBM and lots more graphics.

EDUCATION		PROGRAMMER'S AIDS	
STARTER KIT for programmers	Disk \$25	INTERCEPTOR SUPABASIC	\$35
18 Great programs, including word processor, mailing list, basic programming primer, 6502 intro, sound and sprites.		SPEED BASIC	Disk/Tape \$29
TRAINING KIT how to write programs	Disk/Workbook \$29	ULTRA BASIC 64	Disk/Tape \$65
How to get the most from your keyboard, how to use your disk drive effectively, how to write your first BASIC program.		TURBO EXTENDED BASIC	Tape \$49
32 PROGRAMS	Disk/Book \$25	SIMON'S BASIC	\$69
The book alone retails for \$29.95! 32 useful programs already on disk to save you the chore of punching them in. Book also gives you exercises in how to change them. A vital follow on to the above or to Commodore's Introduction To Basic.		BLITZ! Fastest Compiler of all	\$99
ALL THREE OF THE ABOVE	\$59	SUPERDISC UTILITY Capable 4 ways	\$55
COMMBORRE'S INTRO TO BASIC. (2 Tapes & Book)	\$28	6502 PROGRAM DEVELOPMENT CASSETTE	\$29
EDUCATION 1 (Disk or Tape)	\$25	C80E-PRO 64	\$89
EDUCATION 2 (Tape or Disk)	\$25	SPRITEMASTER	\$35
IVAN BERG EDUCATIONAL SOFTWARE HSC. Tape	\$29	MAE 64 Micro/Assembler	\$99
C64 EDUCATION TAPES (18 for \$280).	\$15	VIC-TREE for programmers	VIC \$99, C64 \$149
COMMBORRE TYPE RIGHT	Disk \$28	OZ ASSEMBLER	\$22
ION TYPING TUTOR Australian Produced	0/7 \$25	PROGRAMMER'S AID	T \$29 D \$32
TYPE ATTACK Learn to type while playing	Disk \$39	MACHINE CODE TUTOR	2 Tapes & Book \$49
TYPING TUTOR/WBIO INVADERS (VIC-20)	\$39	ZEUS Assembler (19 commodities)	\$35
X-REF 64	Disk \$49	UTILITIES	
FBRT 64	\$99	PRINTER GRAPHICS UTILITY	Disk/Tape \$25
PASCAL 64	\$99	64 OBCTOR	\$45
SARGON CHESS 2 Plays at seven levels	DS39 T \$35	1541 PHYSICAL EXAM	\$85
COLOSSUS CHESS 2.0	Disk \$39, Tape \$35	RABBIT (busbs copy protect, leads tape test) (64/VIC20)	\$85
GRANDMASTER	Disk \$39	ARROW (C64/VIC-28) faster still	\$85
EPROM Cartridge Cass	\$39	EPYX FASTLOAD Cartridge (3+ faster)	\$49
HARDWARE		AUTOLAB/DIRECTORY Cartridge	\$39
FLASH '85 with built-in ON/OFF switch	\$175	EDUMATE LIGHT PEN Best, says RUN	\$49
FLASH \$X64 version	\$175	EDUMATE w/ Peripheral Vision	\$69
NUMERIC KEYPAD 64/VIC-20	\$99	BANNER MACHINE makes lang printouts	Disk \$89
DOT MATRIX PRINTER LISTER	\$199	PRINT SHOP cards, logos, letterheads, etc.	Disk \$65
SMITH CORONA delay wheel Printer	\$495	P/SHOP LIBRARY Hundreds of designs	\$49
INTERFACES for 64/128/VIC	12 different from \$49	TATTS 4D or how to win a million	\$85
RS232 DE LUXE INTERFACE	\$99	ANIMAL PEDIGREE US Kennel Club approved	\$135
MSD Single Drive, all metal 240 volt	\$499	GENEALOGY PROGRAM 564 names	\$85
MSD Double Drive, 240 volt US made	\$1285	ASTROLOGY PROGRAM (also IBM/Apple)	\$85
C64 MOTHERBOARD (w/-ram). 3-way \$85, 5-way \$168		VOICE MASTER synthesizes your own voice	\$89
VIC-20 4-way motherboard	\$89	SUPER VOICE MASTER with voice recognition	\$199
64 K MEMORY EXPANSION for 64 and VIC 20	\$299	CURRAH SPEECH 64 two tones	\$69
SYNTHY 64 Companion Albums	\$19	MIND PROBER (also IBM, Apple Macintosh \$69)	\$49
COMPUTER MECHANIC log + car maint. guide	\$19	CASSETTE INTERFACE and DUPLICATOR	\$77
		RACCO SCREEN DUMP	\$59
		PRINTMASTER/W+G graphics i/face	\$99
		PAGEMATE Text holder	\$39
		DISKETTE SAFE, lockable, 180 capacity	\$29
		COMPUCOVER Plastic protective cover	\$29

## BUSINESS MANAGER . . . \$540

Over 1000 already in use throughout Australia. Fully integrated, ready to use accounting system. Includes stock control/inventory, Accounts Receivable and Payable and General Ledger. Menu driven and easy to use. OTHER PROGRAMS AVAILABLE: Pay Roll, Real Estate, Property Management, Insurance Brokers etc.

## 316 XT IBM COMPATIBLE 256K. . \$2950

512K with dual 360K drives, RGB, composite and mono output, all the standard features PLUS \$2,250 of VISICORP software FREE! Buy this powerful IBM XT workalike and get VISIWORD, VISISPELL, VISICALC, VISITREND, VISIDEX, VISIPILOT and MS. DOS free!

## Chambers Computer Supplies

48-52 Monkhouse Drive, Endeavour Hills, Melbourne. 3802.



## SOFTWARE ON THE CHEAP — The Last Month — \$50 to \$100



This is it — the last of the cheap software. Our typist is draped over her chair like a limp rag, we're still searching for our typesetters (no forwarding address), but you ... you now know as much as we do about how many and what kinds of packages you can buy in Australia for under \$100. It's quite encouraging, what you can do on the cheap these days — you can certainly keep your trigger-finger happy, you can take care of your small business accounting with programs like 'Large Figure Subtraction', and learn something new with 'Small Business Accounts', or was it the other way around? The cheap possibilities are numerous.

## Amstrad

### ACCOUNTING

**Home Budget**  
AWA Thorn  
Cassette \$52.50

**Nominal Ledger**  
AWA Thorn  
Disk \$94.50

**Purchase Ledger**  
AWA Thorn  
Disk \$94.50

**Sales Invoicing**  
AWA Thorn  
Disk \$94.50

**Sales Ledger**  
AWA Thorn  
Disk \$94.50

**Stock Control**  
AWA Thorn  
Disk \$94.50

### DATABASES

**Masterfile**  
AWA Thorn  
Cassette, disk \$54.90

### SPREADSHEETS

**Amscalc**  
AWA Thorn  
Cassette \$99.50

**Easi-Amscalc**  
AWA Thorn  
Cassette \$52.50

### GENERAL BUSINESS

**Decision Maker**  
AWA Thorn  
Cassette, disk \$54.90

**Devpac Assembler**  
AWA Thorn  
Cassette \$59.50

**Entrepreneur**  
AWA Thorn  
Cassette, disk \$54.90

**Project Planner**  
AWA Thorn  
Cassette, disk \$54.90

### LANGUAGES

**FORTH**  
AWA Thorn  
Cassette \$54.90

**FORTH CP/M**  
AWA Thorn  
Disk \$59.50

**Hisoft Pascal 4T**  
AWA Thorn  
Cassette \$75

**MicroPROLOG**  
AWA Thorn  
Disk \$94.50

### MISCELLANEOUS

**Screen Designer**  
AWA Thorn  
Disk \$52.50

## Apple II and clones

### GAMES

**Basic Maths & Algebra**  
Imagineering  
Disk \$79.95

**Bumble Games**  
Ashtron Software  
Disk \$54.95

**Bumble Plot**  
Ashtron Software  
Disk \$54.95

**Deadline**  
Imagineering  
Disk \$74.95

**Decathlon**  
Software Source  
Disk \$61

**Flight Simulator**  
Imagineering  
Disk \$89.95

**Gertrude's Puzzles**  
Ashtron Software  
Disk \$54.95

**Gertrude's Secrets**  
Ashtron Software  
Disk \$54.95

**Hitchhiker's Guide to the Galaxy**  
Imagineering  
Disk \$54.95

**Moptown Hotel**  
Ashtron Software  
Disk \$54.95

**Moptown Parade**  
Ashtron Software  
Disk \$54.95

**Robot Odyssey**  
Ashtron Software  
Disk \$69.95

**Rocky's Boots**  
Ashtron Software  
Disk \$69.95

**Sargon II**  
Imagineering  
Disk \$54.95

**Sargon III**  
Imagic, Brainstorm Computer Warehouse  
Disk \$79.95

**Sorcerer**  
Imagineering, Brainstorm Computer Warehouse  
Disk \$74.95

**Starcross**  
Imagineering  
Disk \$54.95

**Suspended**  
Imagineering  
Disk \$74.95

**Ultima II**  
Imagineering, Brainstorm Computer Warehouse  
Disk \$79.95

**Witness**  
Imagineering  
Disk \$74.95

**Wizardry**  
Imagineering, Brainstorm Computer Warehouse  
Disk \$79.95

**Wizardry Scenario 2**  
Imagineering  
Disk \$54.95

**Zork I**  
Imagineering, Ashtron Software  
Disk \$54.95

**Zork I/II**  
Brainstorm Computer Warehouse  
Disk \$54.95

**Zork II**  
Imagineering, Ashtron Software  
Disk \$54.95

**Zork III**  
Imagineering, Ashtron Software  
Disk \$54.95

### EDUCATION

**Algebra 3**  
Imagineering  
Disk \$54.95

**Algebra 4**  
Imagineering  
Disk \$54.95

**Algebra 5 & 6**  
Imagineering  
Disk \$71.45

**Amusement Park**  
SRA  
Disk \$59  
Learn to run your own amusement park.

**Bank Street Speller**  
Ashtron Software  
Disk \$69.95

**Beano**  
SRA  
Disk \$59  
Develop skills of mental computation and strategy.

**BSW Activity Files**  
Ashtron Software  
Disk \$69.95

**BSW Skills Bank**  
Ashtron Software  
Disk \$69.95

**Concentration Crosswords**  
SRA  
Disk \$59  
50 unique puzzles provide hours of word practice and fun.

**Cross Clues**  
SRA  
Disk \$59  
Uncover hidden words in an interlocking grid using your word skills.

**Crypto Cube**  
Imagineering  
Disk \$59.95



# SOFTWARE ON THE CHEAP

**Decimals**  
Imagineering  
Disk \$65.95

**Discover BASIC**  
Ashtron Software  
Disk \$89.95

**English Apple**  
Imagineering  
Disk \$79.95

**Fractions**  
Imagineering  
Disk \$65.95

**Free Enterprise**  
SRA  
Disk \$59  
Learn to make successful business decisions with this corporate game.

**How To Program BASIC**  
Ashtron Software  
Disk \$82.50

**How To Program**  
Imagic  
Disk \$79.95

**Math Blaster**  
Imagineering  
Disk \$69.95

**Math Maze**  
Imagineering  
Disk \$59.95

**Math Regrouping Game**  
McGraw-Hill  
Disk \$90

**Math Skill Game**  
McGraw-Hill  
Disk \$90

**Math Word Games**  
McGraw-Hill  
Disk \$60

**Math/Arith Skills**  
Imagineering  
Disk \$65.95

**Number Chase**  
SRA  
Disk \$59  
Use math clues to uncover the identity of a secret number that your computer has chosen.

**Number Stumper**  
Ashtron Software  
Disk \$54.95

**Print Shop**  
Imagineering  
Disk \$74.95

**Reader Rabbit**  
Ashtron Software  
Disk \$54.95

**Speed Read II**  
Imagineering  
Disk \$89.95

**Spelling Bee Word Primer**  
Imagineering  
Disk \$54.95

**Typing Tutor**  
Software Source  
Disk \$50

**Word Attack**  
Imagineering  
Disk \$69.95

**Word Challenge**  
Imagic  
Disk \$69.95

**Zaxxon**  
Imagineering

## ACCOUNTING

**Personal Accountant**  
Imagic  
Disk \$79.95

## WORD PROCESSING

**The Writer**  
Imagic  
Disk \$79.95

## GENERAL UTILITIES

**Alpha Plot**  
Imagineering  
Disk \$69.95

**Compiler Plus**  
Imagic  
Disk \$89.95

**Double Take**  
Imagineering  
Disk \$54.95

**Fatcat**  
Imagineering  
Disk \$99.95

**Printshop**  
Brainstorm Computer Warehouse  
Disk \$74.95

**Triple Dump**  
Imagineering  
Disk \$64.95

## MISCELLANEOUS

**Beagle Graphics**  
Imagineering  
Disk \$89.95

# Apple IIc

## GAMES

**Bumble Games**  
Ashtron Software  
Disk \$54.95

**Bumble Plot**  
Ashtron Software  
Disk \$54.95

**Gertrude's Puzzle**  
Ashtron Software  
Disk \$54.95

**Gertrude's Secrets**  
Ashtron Software  
Disk \$54.95

**Moptown Hotel**  
Ashtron Software  
Disk \$54.95

**Moptown Parade**  
Ashtron Software  
Disk \$54.95

**Robot Odyssey**  
Ashtron Software  
Disk \$69.96

**Rocky's Boots**  
Ashtron Software  
Disk \$69.95

**Sargon III**  
Imagic  
Disk \$79.95

**The Writer**  
Imagic  
Disk \$79.95

**Wizardry**  
Imagineering  
Disk \$79.95

**Zaxxon**  
Imagineering  
Disk \$59.95

**Zork I**  
Ashtron Software  
Disk \$59.95

**Zork II**  
Ashtron Software  
Disk \$59.95

**Zork III**  
Ashtron Software  
Disk \$59.95

## EDUCATION

**Bank Street Writer**  
Imagineering  
Disk \$79.95

**Bank Street Speller**  
Ashtron Software  
Disk \$69.95

**BSW Activity Files**  
Ashtron Software  
Disk \$69.95

**BSW Skills Bank**  
Ashtron Software  
Disk \$69.95

**Crypto Cube**  
Imagineering  
Disk \$59.95

**Dazzle Draw**  
Imagineering  
Disk \$74.95

**Discover BASIC**  
Ashtron Software  
Disk \$89.95

**How to Program BASIC**  
Ashtron Software  
Disk \$82.50

**How To Program**  
Imagic  
Disk \$79.95

**Master Type**  
Imagineering  
Disk \$69.95

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# SOFTWARE ON THE CHEAP

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**Math Maze**  
*Imagineering*  
Disk \$59.95

**Number Stumper**  
*Ashtron Software*  
Disk \$54.95

**Print Shop**  
*Imagineering*  
Disk \$74.95

**Reader Rabbit**  
*Ashtron Software*  
Disk \$54.95

**Spellicopter**  
*Imagineering*  
Disk \$59.95

**Word Challenge**  
*Imagic*  
Disk \$69.95

## ACCOUNTING

**Personal Accountant**  
*Imagic*  
Disk \$79.95

## GENERAL UTILITIES

**Compiler Plus**  
*Imagic*  
Disk \$89.95

**Moptown Parade**  
*Ashtron Software*  
Disk \$54.95

**Robot Odyssey**  
*Ashtron Software*  
Disk \$69.95

**Rocky's Boots**  
*Ashtron Software*  
Disk \$69.95

**Sargon III**  
*Imagic*  
Disk \$79.95

**The Writer**  
*Imagic*  
Disk \$79.95

**Wizardry**  
*Imagineering*  
Disk \$79.95

**Zaxxon**  
*Imagineering*  
Disk \$59.95

**Zork I**  
*Ashtron Software*  
Disk \$59.95

**Zork II**  
*Ashtron Software*  
Disk \$59.95

**Zork III**  
*Ashtron Software*  
Disk \$59.95

**Concentration Crosswords**  
SRA  
Disk \$59

**Cross Clues**  
SRA  
Disk \$59

**Crypto Cube**  
*Imagineering*  
Disk \$59.95

**Dazzle Draw**  
*Imagineering*  
Disk \$74.95

**Discover BASIC**  
*Ashtron Software*  
Disk \$89.95

**Free Enterprise**  
SRA  
Disk \$59

**How to Program BASIC**  
*Ashtron Software*  
Disk \$82.50

**How to Program**  
*Imagic*  
Disk \$79.95

**Master Type**  
*Imagineering*  
Disk \$69.95

**Math Maze**  
*Imagineering*  
Disk \$59.95

**Number Chase**  
SRA  
Disk \$59

**Number Stumper**  
*Ashtron Software*  
Disk \$54.95

**Print Shop**  
*Imagineering*  
Disk \$74.95

**Reader Rabbit**  
*Ashtron Software*  
Disk \$54.95

**Spellicopter**  
*Imagineering*  
Disk \$59.95

**Word Challenge**  
*Imagic*  
Disk \$69.95

## ACCOUNTING

**Personal Accountant**  
*Imagic*  
Disk \$79.95

## GENERAL UTILITIES

**Compiler Plus**  
*Imagic*  
Disk \$89.95

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# Atari

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## GAMES

**Bumble Games**  
*Ashtron Software*  
Disk \$54.95

**Crossword Magic**  
*Imagineering*  
Disk \$89.95

**Deadline**  
*Imagineering*  
Disk \$79.95

**Facemaker**  
*Ashtron Software*  
ROM cartridge \$54.95

**Flight Simulator**  
*Imagineering*  
Disk \$79.95

**Moptown Hotel**  
*Ashtron Software*  
Disk \$54.95

**Moptown Parade**  
*Ashtron Software*  
Disk \$54.95

**Sargon**  
*Imagineering*  
Disk \$59.95

**Utlma II**  
*Imagineering*  
Disk \$79.95

**Zork I**  
*Imagineering, Ashtron Software*  
Disk \$65.95

**Zork II**  
*Imagineering, Ashtron Software*  
Disk \$65.95

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# Apple IIe

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## GAMES

**Bumble Games**  
*Ashtron Software*  
Disk \$54.95

**Bumble Plot**  
*Ashtron Software*  
Disk \$54.95

**Gertrude's Puzzle**  
*Ashtron Software*  
Disk \$54.95

**Gertrude's Secrets**  
*Ashtron Software*  
Disk \$54.95

**Moptown Hotel**  
*Ashtron Software*  
Disk \$54.95

## EDUCATION

**Amusement Park**  
SRA  
Disk \$59

**Bank Street Writer**  
*Imagineering*  
Disk \$79.95

**Bank Street Speller**  
*Ashtron Software*  
Disk \$69.95

**Beano**  
SRA  
Disk \$59

**BSW Activity Files**  
*Ashtron Software*  
Disk \$69.95

**BSW Skills Bank**  
*Ashtron Software*  
Disk \$69.95



# SOFTWARE ON THE CHEAP

## EDUCATION

### Bank Street Writer

Imagineering  
Disk \$99.95

### BSW Activity Files

Ashtron Software  
Disk \$69.95

### BSW Skills Bank

Ashtron Software  
Disk \$69.95

### Crossword Magic

Ashtron Software  
Disk \$84.95

### Mastertype

Ashtron Software  
Disk \$64.95

## GENERAL BUSINESS

### Graph Magician

Imagineering  
Disk \$69.95

## GENERAL UTILITIES

### Koala Pad

Imagineering  
Disk \$99

## BBC

## GAMES

### Mary Rose

Ashtron Software  
Disk \$69.95

## ACCOUNTING

### Accounts Payable

Gametronics  
Cassette \$61.50

### Accounts Receivable

Gametronics  
Cassette \$61.50

### Invoicing

Gametronics  
Cassette \$61.50

### Mailing System

Gametronics  
Cassette \$61.50

### Order Processing

Gametronics  
Cassette \$61.50

## Purchasing

Gametronics  
Cassette \$61.50

## Stock Control

Gametronics  
Cassette \$61.50

## DATABASES

### Vu File

Gametronics  
Cassette \$51

## SPREADSHEET

### Vu Calc

Gametronics  
Cassette \$51

## Combat Leader

High Technology, Gametronics  
Cassette, disk \$54.95

## Computer Baseball

Gametronics  
Disk \$52.50

## Crossword Magic

Imagineering  
Disk \$89.95

## Dneiper River Line

High Technology, Gametronics  
Disk, cassette \$56.75

## Dragonworld

Computer Reporting Services  
Disk \$50

A non-stop game of mystery and adventure as you travel to rescue The Last Dragon.

## Eagles

Gametronics  
Disk \$52.90

## Enchanted

High Technology  
Disk \$59.95

## Flight Simulator

Imagineering  
Disk \$89.95

## Flight Simulator II

High Technology  
Disk \$79.95

## Fort Apocalypse

High Technology  
Disk \$54.95

## Fortress

Gametronics  
Disk \$52.90

## Geopolitique 1990

Gametronics  
Disk \$52.90

## Germany 1985

Gametronics  
Disk \$52.90

## Golf

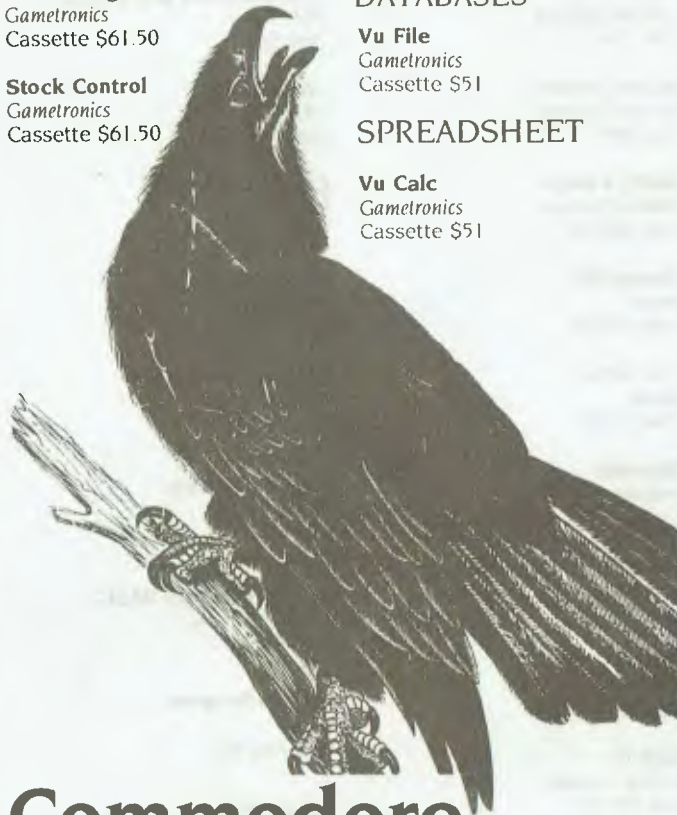
High Technology  
Cassette \$54.95

## Hes Games

High Technology  
Disk \$59.95

## Hitchhiker's Guide to the Galaxy

Imagineering  
Disk \$59.95



## Commodore

## GAMES

### 50 Mission Crush

Gametronics  
Disk \$52.95

### Baltic 1985

Gametronics  
Disk \$52.90

### Beyond Castle Wolf

Imagineering  
Disk \$59.95

### Beyond Castle Wolfenstein

High Technology  
Disk \$54.95

### Blackjack

High Technology  
Disk \$69.95

### Blade of Black Poole

High Technology  
Disk \$59.95

### Blue Max

High Technology  
Disk \$54.95

## Bridge

Commodore  
ROM cartridge \$55  
Learn the fundamentals of the card game 'Bridge'.

## Bridge Made Easy

High Technology  
Disk \$69.95

## Bumble Games

Ashtron Software  
Disk \$54.95

## Bumble Plot

Ashtron Software  
Disk \$54.95

## Championship Lode Runner

High Technology  
Disk \$59.95

## Choplifter

High Technology  
ROM cartridge \$54.95

**INTRODUCING THE WORLD'S FIRST DUAL HEADED PRINTER**

# Now Brother gives you two machines for the price of one.

## **Daisy Wheel or Dot Matrix, the choice is yours in the revolutionary new Twinwriter 5.**

For \$1995.00 it will deliver 36 cps letter quality daisy wheel print, and 140 cps dot matrix type and graphics — more efficiently and much more economically than any other two machines you can name. The Twinwriter can put you around \$1000 in front, save you valuable time and will only take up half the space.

Brother's breakthrough dual printhead technology means you can now produce daisy wheel quality copy and dot matrix graphics in the same document. At the push of a button — or through software driven commands.

### **Other features include:**

- 3K byte buffer (optional 11K or 19K byte)
- 136 columns
- 420 cms (16.5 inches) paper width
- Centronics Interface with optional RS-232C converter
- Interchangeable daisy wheel cassettes.

## **Plus a range of cost efficient options.**

This highly versatile printer can be made even more efficient but with the addition of a cut-sheet or tractor feeder. Brother are recognised as the experts in printer productivity and we know you'll soon recognise the cost benefits of these invaluable accessories.



TF-300  
TRACTOR FEEDER  
\$189 r.r.p.



CF-300  
CUT-SHEET FEEDER  
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The new Brother Twinwriter 5. Two of the best printers money can buy. In one beautiful package.



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CNO 1360



# SOFTWARE ON THE CHEAP

**Indiana Jones**  
Imagineering  
Disk \$54.95

**Jupiter Mission 1999**  
Gametrionics  
Disk \$94.50

**Knights of the Desert**  
Gametrionics  
Disk \$52.90

**Legionaire**  
Gametrionics  
Disk, cassette \$75.50

**Legionnaire**  
High Technology  
Cassette, disk \$66.50

**London Blitz**  
High Technology  
Disk \$75.50

**Moptown Hotel**  
Ashtron Software  
Disk \$54.95

**Moptown Parade**  
Ashtron Software  
Disk \$54.95

**Panzer East**  
Gametrionics  
Disk \$56.75

**Panzer-East**  
High Technology  
Disk \$56.75

**Panzer-Jagd**  
Gametrionics, High Technology  
Disk \$56.75

**Practical Genetics**  
High Technology  
Disk \$68.40

**Professional Tour Golf**  
Gametrionics  
Disk \$52.90

**RDF 1985**  
Gametrionics  
Disk \$52.90

**Rendezvous with Rama**  
Computer Reporting Services  
Disk \$50  
Your mission is to explore this new world and return home before it leaves this solar system.

**Ringside Seat**  
Gametrionics  
Disk \$52.90

**Sammy Lightfoot**  
High Technology  
ROM cartridge \$54.95

**Sargon III**  
Imagineering  
Disk \$79.95

**Serpentine**  
High Technology  
ROM cartridge \$59.95

**Sorcerer**  
High Technology  
Disk \$69.95

**TAC (Tactical Armous Command)**  
High Technology, Gametrionics  
Disk \$70.90

**Telengard**  
High Technology, Gametrionics  
Disk \$52.50

**The Battle of Normandy**  
Gametrionics  
Disk \$52.90

**The Battle of Norway**  
Gametrionics  
Cassette \$52.90

**The Cosmic Balance**  
Gametrionics  
Disk \$52.50

**The Game Show**  
Commodore  
Disk \$55  
A game of clues and target concepts.

**Tigers In the Snow**  
Gametrionics  
Disk, cassette \$52.90

**Tournament**  
Gametrionics  
Disk \$56.75

**Tournament Golf**  
High Technology  
Disk \$56.75

**Trivia Fever**  
High Technology, Imagineering  
Disk \$59.95

**Word Attack**  
High Technology  
Disk \$69.95

**Zaxxon**  
High Technology  
Disk \$59.95

## EDUCATION

**Addition Magician**  
High Technology  
Disk \$64.95

**Algernon**  
High Technology  
Disk \$79.95

**Alphabet Construction**  
High Technology  
Disk \$79.95

**Amazon**  
Computer Reporting Services  
Disk \$50  
Trek through the unexplored Amazon jungle to complete your top-secret mission for NSRT.

**Animal Crackers**  
High Technology  
Disk \$79.95

**Arith/Algebra**  
Imagineering  
Disk \$79.95

**Assembler Development 64**  
Commodore  
Disk \$60  
For the experienced user to write software in Assembly language.

**Bank Street Music Writer**  
Imagineering  
Disk \$89.95

**Bank Street Writer**  
High Technology  
Disk \$79.95

**Basic Arithmetic & Algebra**  
High Technology  
Cassette, disk \$79.95  
Part of the Computer Tutor series.

**Basic Arithmetic & Algebra**  
Ozisoft  
Cassette, disk \$79.95  
A step-by-step guide through the material in the BASIC Arithmetic & Algebra in the HSC course.

**Bearjam**  
High Technology  
ROM cartridge \$59.95

**Black Kayles**  
High Technology  
Disk \$59.95

**BSW Activity Files**  
Ashtron Software  
Disk \$69.95

**BSW Skills Bank**  
Ashtron Software  
Disk \$69.95

**Bumble Games**  
High Technology  
Disk \$64.95

**Bumbles Bee**  
High Technology  
Disk \$59.95

**Challenge Maths**  
High Technology  
Disk \$79.95

**Classics Old and New**  
High Technology  
Disk \$79.95

**Coco 64**  
High Technology  
Cassette, disk \$69.95

**English**  
Imagineering  
Cassette, disk \$79.95

**English Sentence Construction (HSC)**  
High Technology  
Cassette, disk \$79.95  
Part of the Computer Tutor series.

**Exploring LOGO**  
High Technology  
Disk \$79.95

**Fahrenheit 451**  
Computer Reporting Services  
Disk \$50  
You must escape the Mechanical Hounds and help the 'underground' rescue mankind from ignorance.

**French 1-4**  
High Technology  
Disk \$59.95

**Get Ready To Read and Add**  
High Technology  
Disk \$79.95

**Gortek & Microchips**  
High Technology  
Cassette \$50

**Gortex and the Microchips**  
Commodore  
Cassette \$50  
A space adventure game and lesson in BASIC programming combined. A different way to learn.

**How about Game Chess**  
Imagineering  
Disk \$54.95

**Italian 1-4**  
High Technology  
Disk \$59.95

**Junior Math**  
High Technology  
Disk \$68.40

**Koala Pad**  
Imagineering  
Disk, cassette \$99

## SOFTWARE ON THE CHEAP

**Koala Printer**  
Imagineering  
Disk \$54.95

**Koalagrams**  
Imagineering  
Disk \$59.95

**Latin 1-4**  
High Technology  
Disk \$59.95

**Leo's Links**  
High Technology  
ROM cartridge \$59.95

**Letter Games**  
High Technology  
Disk \$59.95

**Logic Master**  
High Technology  
ROM cartridge \$59.95

**Logo**  
High Technology  
Disk \$80

**Master Type**  
High Technology, Imagineering  
Disk \$64.95

**Math Blaster**  
High Technology, Imagineering  
Disk \$69

**Meet the Computer (Beginner BASIC)**  
High Technology  
Disk \$54.95

**Meet the Computer (Int. BASIC)**  
High Technology  
Disk \$59.95

**Micro Encyclopedia**  
High Technology  
Disk \$79.95

**Milk Bottles**  
High Technology  
Disk \$59.95

**Moptown Parade**  
High Technology  
Disk \$64.95

**Mr Pixel Paint Set**  
Imagineering  
Disk \$64.95

**Musicalc # 1**  
High Technology  
Disk \$69.95

**Peripheral Vision**  
High Technology  
Disk \$99.95

**Pilot**  
High Technology, Commodore  
Disk \$60

**Pockets**  
High Technology  
Disk \$79.95

**Practical Maths**  
High Technology  
Disk \$57

**Puss in Boots**  
High Technology  
Disk \$59.95

**Reader Rabbit**  
Ashtron Software  
Disk \$54.95

**Red Riding Hood**  
High Technology  
Disk \$79.95

**S.A.M.**  
Imagineering  
Disk \$74.95

**S.A.M. Speech Synthesiser**  
High Technology  
Disk \$69.95

**Show Director**  
Imagineering  
Disk \$64.95

**Simons' BASIC**  
Commodore  
ROM cartridge \$80  
A program designed to enable programmers of all levels to utilise the potential of their C64.

**Songwriter**  
High Technology  
Disk \$59.95

**Speed Read II**  
Imagineering  
Disk \$99.95

**Speed Reader II**  
High Technology, Commodore  
Disk \$89

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65,000 characters per field!  
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## With Network Revelation<sup>®</sup>, you're not alone.

Span the void that separates you from other PC's. Be as one with a universe of data. Be a true network with Network Revelation.

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## SOFTWARE ON THE CHEAP

**Survival Maths**  
High Technology  
Disk \$79.95

**Teasers by Tobbs**  
High Technology  
Disk \$79.95

**The Factory**  
High Technology  
Disk \$79.95

**The Game Show**  
High Technology  
Disk \$55

**The Incredible Laboratory**  
High Technology  
Disk \$79.95

**The King's Rule**  
High Technology  
Disk \$79.95

**The Pond**  
High Technology  
Disk \$79.95

**The Right Turn**  
High Technology  
Disk \$79.95

**Tic Tac Show**  
High Technology, Commodore  
Disk \$55

**Timetable Program**  
High Technology  
Disk \$96.90

**Traffic Jam/Chain Reaction**  
High Technology  
Disk \$59.95

**Turtle Graphics**  
High Technology  
ROM cartridge \$79.95

**Type Attack**  
High Technology  
Disk \$54.95

**Vanilla Pilot**  
High Technology  
Disk \$79

**Word Attack**  
High Technology, Imagineering  
Disk \$69

**Word Spinner**  
High Technology  
Disk \$64.95

**Young People's Literature**  
High Technology  
Disk \$79.95

### ACCOUNTING

**Cashflow Budget**  
Sunrise Software  
Disk \$100  
Create your own monthly cash-flow budget.

**M-64 Creditors**  
Commodore  
Disk \$100  
Part of the M-64 Account System.

**M-64 Debtors**  
Commodore  
Disk \$100  
A comprehensive package for the business person who has not had a lot to do with computers.

**M-64 General Ledger**  
Commodore  
Disk \$100  
Part of the M-64 Account System.

**M-64 Sales Analysis/Invoicing**  
Commodore  
Disk \$100  
Part of the M-64 Account System.

**M-64 Stock Control**  
Commodore  
Disk \$100  
Part of the M-64 Account System.

### DATABASES

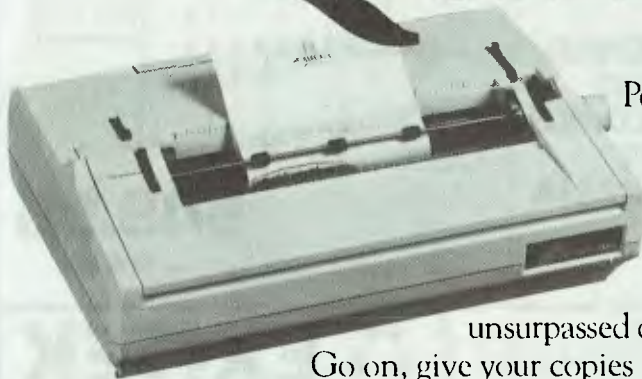
**Data Manager II**  
High Technology  
Disk \$59.95

**Diary 64**  
Commodore  
Disk \$55  
Keep track of telephone numbers, addresses, appointments, birthdays and schedules.

**Easy File**  
High Technology, Commodore  
Disk \$100

**Easy Stock**  
High Technology  
Disk \$100

# Don't Xerox it, Qume it.



Give them all a Qume original. Exclusive. Personal. Unique. Letter quality printing.

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Garland Farwag & Stewart SDC 3214C



# SOFTWARE ON THE CHEAP

## Magic Desk I

Commodore

Disk, ROM cartridge \$60

An innovative package for small business and home use.

## Micro Magpie

High Technology

Disk \$89.95

## Personal Data File

High Technology

Disk \$59.95

## The Manager

High Technology, Commodore

Disk \$80

## WORD PROCESSING

### Easy Mail

Commodore

Disk \$80

Keep track of names and addresses, and simplify label printing.

### Easy Script

Commodore

Disk \$100

A powerful word processing package that enables you to create, modify and print text quickly.

## Easy Spell

Commodore

Disk \$80

A spelling checker for files produced by the Easy Script word processing package.

## Segawriter

High Technology

Disk \$95

## Simple

High Technology

Cassette \$59

## Word/Name Machine

Commodore

Disk \$80

A word processing package designed for beginners.

## SPREADSHEETS

### Calc Result Easy

Commodore

Disk, ROM cartridge \$100

This program has full editing facilities and complete graphics for screen and printer outputs.

## Easy Calc Result

High Technology

ROM cartridge \$100

## Easy Stock

Commodore

Disk \$80

Stock control system designed for retailers and small businesses.

## Micro Swift

High Technology

Disk \$69.95

## GENERAL BUSINESS

### Creative Calc

Imagineering

Disk \$64.95

### Creative Filer

Imagineering

Disk \$64.95

### Creative Writer

Imagineering

Disk \$64.95

## Dairy (Pool System)

Sunrise Software

Disk \$100

Determines gross monthly milk cheque, analysis of variable costs, financial outcome and so on.

## Dairy (Quota)

Sunrise Software

Disk \$100

Determines gross monthly milk cheque, analysis of variable costs, financial outcome and so on.

## Dayplan 64

Sunrise Software

Disk \$100

366-day electronic diary. Keeps track of events, projects, special dates and so on.

## Easy Disk

Imagineering

Disk \$54.95

## Easy Script

High Technology

Disk \$100

# BEEARTISTIC.

You have a choice of drawing tools: pencil, brush, spray-can, fill can, eraser.

Draw points, lines, boxes, ellipses or handcrafted drawings.

User-definable patterns - defined areas may be filled or you may brush them on. Text and graphics can be combined; perfect for overhead projector artwork, etc.

"Cut & Paste" facility. Define your own icons and copy them.

Zoom editing - allows you to edit your art in fine detail.

Pictures can be saved on or retrieved from disk, or printed out.

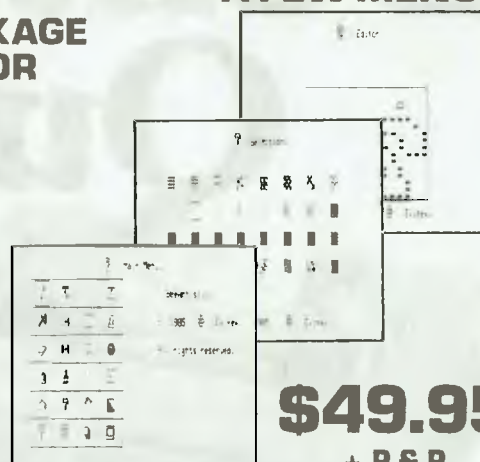
BEESLIDE - a variable speed slide-show package; user defined order and files.

Min. Requirements: 32k Microbee, CP/M, 1 disk drive (40 track DSDD), Epson compatible printer (option).

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THE  
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AND  
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When **V** wanted IBM Compatible Computer Systems and Add Ons, they chose products and parts from around the world.

## AND THEN BECAME A STANDARD

### Systems

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Ultra Reliable 10 & 20 NEC mbyte complete hard drive systems priced at \$1400 and \$1950. Controller cards utilize advanced dual buffer data technology ensuring faster transfer speed. All units are thoroughly tested and formatted before delivery. Full one year warranty.

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supply: network, prototypeing, 384k multifunction, 384k memory, 512k memory, floppy disk driver, mono/graphics (hercules equivalent). Colour graphics, iee488, eprom writer, ad/da and many more.

### Monitors

Super High Resolution Direct drive monitors with tilt and swivel stands. High Contrast European Amber phosphor standard. Full 1 year warranty. Priced \$250.

### Accessories

Power supplies, keyboards, disk drives, printers, ram chips.

### Available in the near future

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All **V** products are backed via our 6 months parts and labour policy except monitors and hard drive units which are 12 months. Plus our exclusive 24-hour repair policy. (If we can't fix it within 24 hours, we will just replace the defective modular part).

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• 8 slot motherboard with 256k ram	YES	NO	YES	YES
• 150 watt power supply	YES	NO	YES	NO
• Mono/graphics card standard w/parallel printer port hercules equivalent	YES	NO	YES	NO
• 384 k multi function card standard	YES	NO	YES	NO
• 2 parallel/serial/calander/clock/jstick ports standard	YES	NO	YES	NO
• Choice of 2 styles of keyboards	YES	NO	YES	NO
• 6 months warranty standard	YES	NO	YES	NO

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Mailing Address:  
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# SOFTWARE ON THE CHEAP

## Electronic Cashbook

Commodore  
Disk \$100

This package includes such features as periodical payments, bank balance and enquiry searches.

## Graph Magician

Imagineering  
Disk \$69.95

## HES Writer

High Technology  
Disk \$65.95

## Hesmon 64

Imagineering  
ROM cartridge \$59.95

## Micro Wordcraft

High Technology  
Disk \$59.95

## M64 Creditors

High Technology  
Disk \$100

## M64 Debtors

High Technology  
Disk \$100

## M64 General Ledger

High Technology  
Disk \$100

## M64 Stock Control

High Technology  
Disk \$100

## Paper Clip

High Technology, Imagineering  
Disk \$99.95

## Print Card Shop

Imagineering  
Disk \$69.95

## Sales Analysis/Invoices

High Technology  
Disk \$100

## Small Business Systems

High Technology  
Disk \$99

## Sunrise Beef Cattle

Sunrise Software  
Disk \$100  
Determine head profitability, variable costs and expenses, gross margin and more.

## Sunrise Cropping

Sunrise Software  
Disk \$100  
Determine profitability, analysis of profitability, effects of budgets and crop comparison.

## Sunrise Sheep

Sunrise Software  
Disk \$100  
Determine profitability, variable costs and expenses, gross margin and financial outcome.

## The Auto Dealer

High Technology  
Disk \$69.95

## The Membership Manager

High Technology  
Disk \$69.95

## The Repair Shop

High Technology  
Disk \$69.95

## Time & Money Manager

High Technology  
Disk \$99.95

## Ultrastats

Planet Pictures  
Disk \$70  
Designed to aid you with statistics. This program draws graphs and bar charts.

## Write Now

High Technology  
ROM cartridge \$79.95

## Assembler Development

High Technology  
Disk \$60

## Assembler Tutorial

High Technology  
Cassette, disk \$55

## BASM

Ozisoft, High Technology  
Disk \$99  
A BASIC that thinks like an assembly language.

## Forth

Commodore  
ROM cartridge \$80  
Suitable for nearly every imaginable application in business and in process control.

## G-Pascal

Commodore  
Disk, ROM cartridge \$79

## Logo

High Technology, Commodore  
Disk \$100

## Simon's BASIC

High Technology  
ROM cartridge \$80

## GENERAL UTILITIES

### 3001 Sound Odyssey

High Technology  
Cassette, disk \$54.95

### Bonus Pack

High Technology  
Cassette, disk \$59

### Cadpic (Paintapic and Printapic)

High Technology  
Cassette, disk \$89.95

### CP/M System

High Technology  
ROM cartridge \$80

### Diary 64

High Technology  
ROM cartridge \$91.95

### Easy Mail

High Technology  
Disk \$80

### Easy Pilot

High Technology  
Disk \$80

### Fast Load Cartridge

Abraxas Computers  
ROM cartridge \$55  
Disk speed-up cartridge for 1541 disk drive; includes machine code monitor and disk utilities.

### Hes Mon 64

High Technology  
ROM cartridge \$54.95

### Hyper Load

High Technology  
ROM cartridge \$59.95

### Kawasaki Synthesiser

High Technology  
Cassette, disk \$64.95

### Light Pen

High Technology  
Cassette, disk \$79.95

### Magic Desk I

High Technology  
ROM cartridge \$60

### Magic Voice

High Technology  
ROM cartridge \$100

### Mon 64

High Technology  
ROM cartridge \$70

## Petspeed Compiler

High Technology, Commodore  
Disk \$90

## Rhythm Rocker

High Technology  
Cassette, disk \$54.95

## RTTY/CW/SSTV

High Technology  
ROM cartridge \$79.95

## Screen Dump

High Technology  
Disk \$54.95

## Tech Sketch Light Pen

High Technology  
Cassette, disk \$89.95

## The Incredible Keyboard

High Technology  
Cassette, disk \$69.95

## VIP Terminal

Commodore  
Disk \$100  
Allows you to transfer programs and text, via your modem, to other VIP users.

## MISCELLANEOUS

### Graf 64

Commodore  
ROM cartridge \$55  
Plot mathematical functions by their graph.

### Mon 64

Commodore  
ROM cartridge \$80  
This package requires the full 64 Kbytes of memory, and has built-in help screens and a reset function.

### Stat 64

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#### **APOLOGY**

"In the August edition of 'Your Computer' there were published comments which were attributed as a quotation from 'Today's Computers'. Those comments were never published by Today's Computers and Bi Computer Pty. Ltd. apologises for the wrongful attribution of those comments to 'Today's Computers' and for any embarrassment or harm which may have been suffered by 'Today's Computers' by reason of this mistake.

This is notwithstanding the fact that we have a request from 'Today's Computers' for a review of our computer Bi-XT-88 from which the abovementioned comments were an extract from the unedited editorial after the review.

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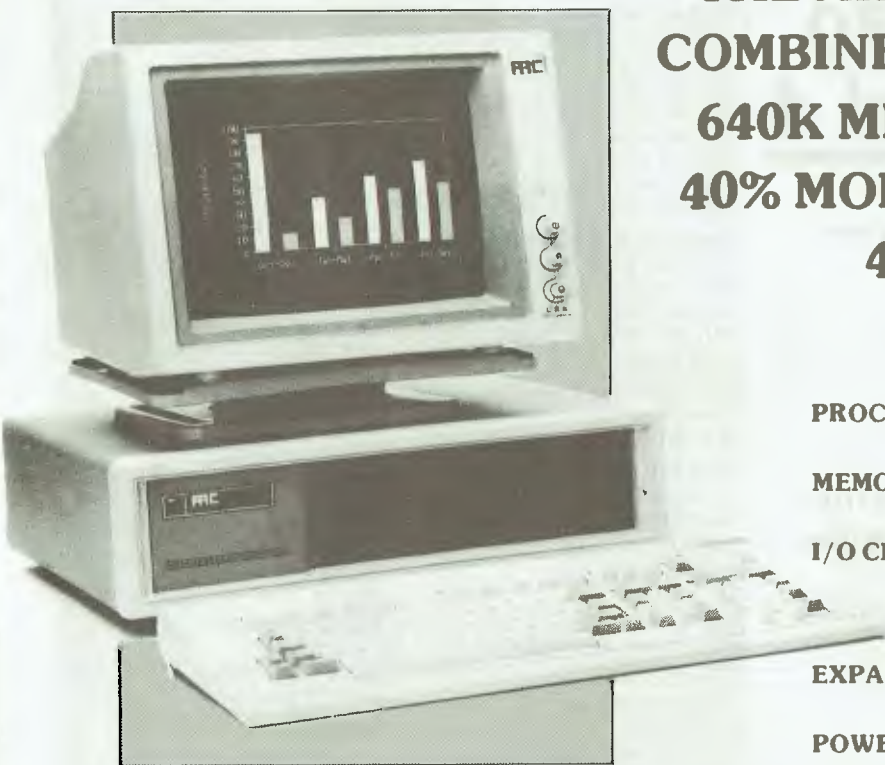
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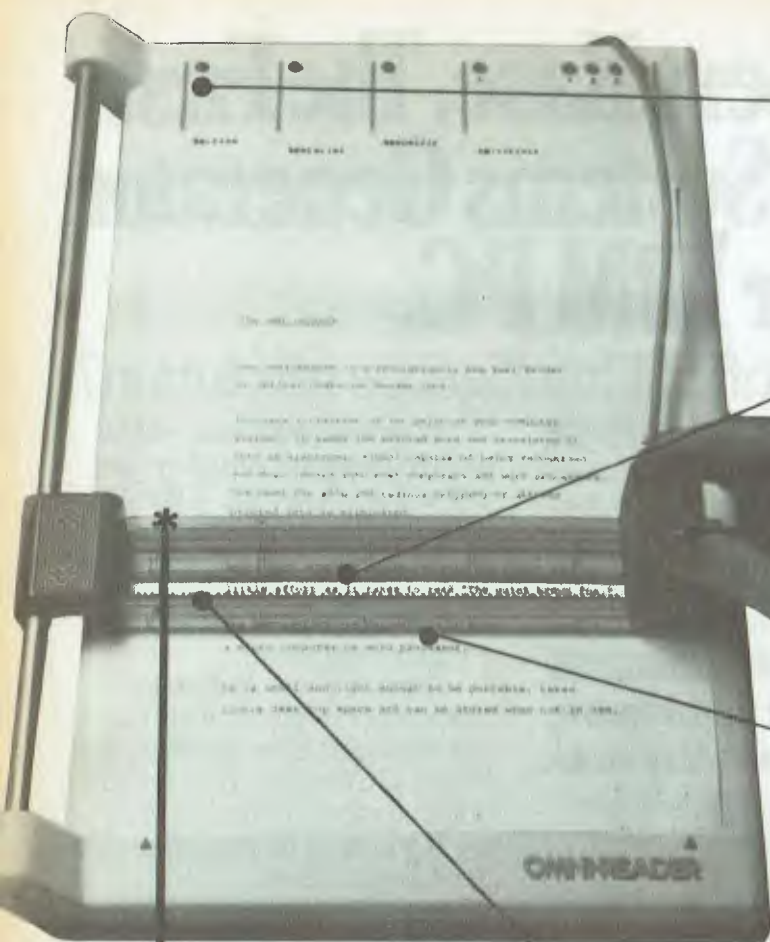
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# Microsoft BASIC

## SUPERMAIL — THE UNIVERSAL MAILING LIST MANAGER

NEED TO PRINT mailing labels, envelopes or personalised mail from a mailing list? Supermail can solve your problems. There are versions of Supermail, written in Microsoft BASIC, for the IBM PC, NEC PC 8201 and Tandy Model 100. With a few adaptations to line 261, 262 or 263, which control serial port syntax on the target machine, all machines using Microsoft BASIC should be okay.

### Printers

Serial and parallel printers are supported, and the user chooses which to use as the program runs. This is achieved by avoiding the use of LPRINT, nominating a numbered file to be the serial or parallel port, and printing to that file. Lines 261, 262 and 263 call for serial port parameters of 300 baud, 8-bit word length, one stop bit and no parity. To use printers requiring other parameters for the serial port you'll have to modify line 261, 262 or 263.

### Program Features

Supermail creates a Mailmerge-

compatible database, and from it makes mailing labels, addresses envelopes and creates personalised bulk mail. Room is provided for additional routines to sort the database and to make reports.

### Database Structure

The first field has a fixed length and is for the postcode. The remaining fields, starting with 'last-name', are of variable length for most efficient use of memory in the Tandy 100 and NEC PC 8201. These two fields allow easy sorting by postcode into areas, or sorting into alphabetical order according to surname. Only sequential files are used, due to the file limitations of the NEC and Tandy.

### Program Structure

The program starts with initialisation routines and an opening menu. Separate subroutines are used to add names to the database, to print labels, envelopes and letters, and for error handling. As printed, the listing is for an IBM PC. To use it on a NEC PC

8201 put a REM at the start of line 261, and remove the ' from the start of line 262. For the Tandy 100, add a REM to line 261, and remove the ' from line 263.

### File Buffers

Line 150 has the statement MAXFILES=3. This is required for the NEC and Tandy to allocate file buffers for input and output. It isn't required for the IBM but has no ill effect, since IBM PC BASIC allocates three buffers automatically and only sees the MAXFILES as an unused variable.

### Optional Routines

On my NEC 8201, I took the sort routine from page 181 of the Tandy 100 manual, renumbered it, replaced the END statement with a CLOSE:GOTO 570, and put it between lines 5070 and 5995. IBM PC-DOS 2.00 (and later) has a SORT filter that does this job very efficiently, and the space could be better used for a report generation routine.

### Remarks Fields

The 'Add a name' routine creates two remarks fields in the database. The first of these allows 255 characters of remarks. Line 1160 creates the second remarks field as an empty field. If more than

255 characters of remarks are required, replace line 1160 with a routine similar to the one in line 1150. None of the printing routines, as written, displays the remarks. A report routine could include them, and they could be used for diverse purposes, such as showing which club members are overdue with annual membership fees!

### Form Letters

Form letters require preformatted text for the body of the letter, with a carriage return/linefeed at the end of each line. PC-Write will create such files for IBM. For the Tandy or NEC, manual splitting of text into lines with the return key will be required. Files created by programs such as Wordstar in document mode include all sorts of characters not in the normal ASCII sequence. Such files should be put through a stripper program to convert them to pure ASCII before using Supermail.

Supermail is easy to use and is fully menu driven. It is a simple program, but quite powerful and very useful. Even if you only use it to create a data file for Mailmerge, you'll quickly see its worth. □

```

10 ' *****
20 ' *
30 ' *      ***superMAIL***
40 ' *
50 ' *****
60 '
70 ' copyright John Hepworth
80 ' Haberfield, Australia, August 1984
90 '
100 ' Individual use permitted.
110 '
120 ' Not to be resold or used for
130 ' commercial purposes
140 '
150 CLEAR 1000:MAXFILES=3 'maxfiles is
    needed by NEC & TANDY laphelds
160 DIM NA$(3,8) 'NA$ is the name and
    address array
170 CLS:ER=10:'OF$="Printer chosen"
180 ON ERROR GOTO 3570
190 PRINT:PRINT:PRINT SPACE$(13);
    "***superMAIL***"
200 PRINT:PRINT:PRINT SPACE$(8);

```

```

"multipurpose mass mailer"
210 PRINT:PRINT SPACE$(8); "Copyright
    John Hepworth"
220 FOR N=1 TO 1000:NEXT N
230 INPUT "<P>arallel or <S>erial
    printer";OS$
240 N=INSTR("PpSs",OS$)
250 IF N=0 THEN PRINT "Try again":GOTO
    230
261 IF N=1 OR N=2 THEN OPEN "LPT1" FOR
    OUTPUT AS#3 ELSE OPEN
    "COM1:3,n,8,1" FOR OUTPUT AS#3
    'IBM version of line 260
262 ' IF N=1 OR N=2 THEN OPEN "LPT:" FOR
    OUTPUT AS#3 ELSE OPEN "COM:3n8lx"
    FOR OUTPUT AS#3 'NEC version -
    line 260
263 ' IF N=1 OR N=2 THEN OPEN "LPT:" FOR
    OUTPUT AS#3 ELSE OPEN "COM:38nle"
    FOR OUTPUT AS#3 'TANDY version -
    line 260
500 '
510 ' *****
520 ' *

```



## Microsoft BASIC

```

530 ' *          ** first menu **          *
540 ' *
550 ' *****
560 '
570 CLS:PRINT:PRINT"    Select one
    alternative"
580 PRINT"<A> Add a name and address to
    the file"
590 PRINT"<L> Print labels"
600 PRINT"<E> Print envelopes"
610 PRINT"<B> Print bulk mail"
620 PRINT"<Q> Quit, and return to main
    menu"
625 PRINT"<O> Other option"
630 INPUT CH$
640 ON INT(INSTR("AaLlEeBbQqOo",CH$)/2+.5)
    GOTO 1070,1570,2070,2570,3030,5030
650 GOTO 570

1000 '
1010 ' *****
1020 ' *
1030 ' * Adding a name to the file *
1040 ' *
1050 ' *****
1060 '

1070 FILES:INPUT "TO WHICH FILE DO YOU
    WANT TO ADD NAMES"; A4$
1080 OPEN A4$ FOR APPEND AS #1
1085 FOR N= 0 TO 8:A4$(N)="" :NEXT N
1090 INPUT "Courtesy title <eg Mrs, Ms,
    Mr, Dr >";A4$(1)
1100 INPUT "First name(s) or initials ";
    A4$(2)
1110 INPUT "Last name ";A4$(3)
1120 INPUT "Street number and street
    name";A4$(4)
1130 INPUT "Town (or suburb) and
    state";A4$(5)
1140 INPUT
    "Postcode";A4$(6):PC=LEN(A4$(6)):
    IF PC<4 THEN A4$(6)=SPACE$(4-PC)
    +A4$(6) ELSE IF PC>4 THEN PRINT
    "POSTCODE TOO LONG":GOTO 1140
1150 INPUT "Remarks";A4$(7)
1160 A4$(8)=""
1170 FOR N=1 TO 8:
    CO=INSTR(A4$(N),","):IF CO>0 THEN
    MID$(A4$(X),CO,1)="" :NEXT N
1180 PRINT #1,
    A4$(6),"",A4$(3),"",A4$(1),"",A4$(2),"",
    "A4$(4)","",A4$(5),"",A4$(7),"",A4$(8)
1190 INPUT "add another name and
    address"; IP$
1200 IF INSTR("YyNn",IP$)=0 GOTO 1190
1210 IF INSTR("Yy",IP$) THEN 1090
1220 CLOSE #1:GOTO 570

1500 '
1510 ' *****
1520 ' *
1530 ' * label printing routine *
1540 ' *
1550 ' *****
1560 '
1570 CLS:PRINT:PRINT"printing labels"
1580 INPUT "No of labels across sheet (1
    to 3)";LA:IF LA<1 OR LA>3 GOTO 1580
1590 INPUT "No of lines per label (3 or
    more)";LL:IF LL<3 GOTO 1590
1600 INPUT "No columns of type across
    sheet";LS
1610 CLS:FILES:INPUT "Filename for names
    and addresses";NA$:OF$=NA$:OPEN NA$
    FOR INPUT AS #1
1620 INPUT "HOW MANY COPIES OF EACH
    LABEL";CL
1630 CN=0
1640 CN=CN+1:I$=INKEY$:IF I$=CHR$(27)
    THEN CLOSE #1:GOTO 570 'hit
    <escape> to abort print run and
    return to end.
1650 FOR N=1 TO LA
1660     FOR M=1 TO 8
1670         INPUT #1, NA$(N,M)
1680         IF (EOF(1) AND N<LA) THEN
            GOTO 1720
1690     NEXT M
1700 NEXT N
1710 GOTO 1770
1720 FOR X=N+1 TO LA
1730     FOR M=1 TO 8
1740         NA$(X,M)=""
1750     NEXT M
1760 NEXT X
1770 FOR X= 1 TO LA
1780     L$=NA$(X,3)+" "+NA$(X,4)+
        " "+NA$(X,2)
1790     PRINT L$
1800     PRINT #3, SPACE$(5) +L$+
        SPACE$(LS\LA -5-LEN(L$));
1810 NEXT X
1820 PRINT #3,""
1830 FOR X= 1 TO LA
1840     L$=NA$(X,5)
1850     PRINT #3, SPACE$(5) +L$+
        SPACE$(LS\LA -5-LEN(L$));
1860 NEXT X
1870 PRINT #3,""
1880 FOR X=1 TO LA
1890     L$=NA$(X,6)+" "+NA$(X,1)
1900     PRINT #3, SPACE$(5) +L$+
        SPACE$(LS\LA -5-LEN(L$));
1910 NEXT X
1920 PRINT #3,""
1930 FOR N= 1 TO LL-3:PRINT #3,"" :NEXT N

```

## Microsoft BASIC

```

1940 IF EOF(1) THEN GOTO 1960
1950 GOTO 1650
1960 IF CN<CL THEN CLOSE #1:OPEN NA$ FOR
      INPUT AS#1:GOTO 1640 ELSE CLOSE
      #1:GOTO 570
2000 '
2010 ' *****
2020 ' *
2030 ' *      envelope printing routine      *
2040 ' *
2050 ' *****
2060 '
2070 PRINT:PRINT"printing envelopes"
2080 INPUT "Width of envelope in
      characters ";EW
2090 INPUT "Height of envelope in
      lines";EH
2100 ML=EW\3
2110 FILES:INPUT"Filename for names and
      addresses";NA$:OF$=NA$:OPEN NA$ FOR
      INPUT AS #1
2120 PRINT"Drop in an envelope and hit
      <spacebar> to continue"
2130 I$=INKEY$:IF I$<>CHR$(32) GOTO 2130
2140 CLS
2150 FOR N=1 TO (EH\2+12):PRINT #3,""
      :NEXT N ' 12 is number of line
      feeds to bring top of envelope in
      line with print head
2160 FOR M=1 TO 8
2170   INPUT#1,NA$(1,M)
2180 NEXT M
2190 PRINT NA$(1,2)
2200 PRINT #3, SPACE$(ML);NA$(1,3)+" "
      +NA$(1,4)+" " +NA$(1,2)
2210 PRINT #3, SPACE$(ML);NA$(1,5)
2220 PRINT #3, SPACE$(ML);NA$(1,6)+" "
      +NA$(1,1)
2230 FOR N=1 TO EH:PRINT #3, "":NEXT N
2240 IF EOF(1) THEN CLOSE #1:GOTO 570
2250 GOTO 2120
2500 '
2510 ' *****
2520 ' *
2530 ' *      letter printing routine      *
2540 ' *
2550 ' *****
2560 '
2570 PRINT:PRINT"printing letters"
2580 FILES:INPUT "Filename for names and
      addresses";NA$: OF$=NA$:OPEN NA$
      FOR INPUT AS #1
2590 FILES:INPUT "Filename for body
      text";BT$:OF$=BT$:OPEN BT$ FOR
      INPUT AS #2
2600 INPUT"No of blank lines above
      date";BL
2610 INPUT "Enter today's date";DT$:IF
      BL<4 THEN SS$="":ST$="":GOTO 2620
2612 INPUT"Sender's Street No & Name";
      SS$
2615 INPUT"Sender's Town and
      Postcode";ST$
2620 INPUT "Width of left margin";ML
2630 PG=1
2640 LC=0
2650 FOR N=1 TO BL:PRINT #3, "":
      LC=LC+1:NEXT N
2655 PRINT #3,SPACE$(ML)+SS$:
      PRINT#3,SPACE$(ML)+ST$:LC=LC+2
2660 PRINT #3, SPACE$(ML);DT$
2670 FOR M=1 TO 8
2680   INPUT#1,NA$(1,M)
2690 NEXT M
2700 FOR N=1 TO 5:PRINT #3,"" :
      LC=LC+1:NEXT N
2710 PRINT #3, SPACE$(ML);NA$(1,3)+" "
      +NA$(1,4)+" " +NA$(1,2):LC=LC+1
2720 PRINT #3,
      SPACE$(ML);NA$(1,5):LC=LC+1
2730 PRINT #3, SPACE$(ML);NA$(1,6)+
      " " +NA$(1,1):LC=LC+1
2740 FOR N=1 TO 3:PRINT #3,"" :
      LC=LC+1:NEXT N
2750 PRINT #3, SPACE$(ML);"Dear " +
      NA$(1,3)+ " " +NA$(1,2)+",":LC=LC+1
2760 FOR N=1 TO 2:PRINT #3,
      :LC=LC+1:NEXT N
2770 LINE INPUT #2,LI$
2780 IF LI$=CHR$(128) THEN LI$="":
      GOSUB 2860
2790 IF LC>61 THEN GOSUB 2860
2800 PRINT #3, SPACE$(ML)+LI$:LC=LC+1
2810 IF EOF(2) THEN FOR N=LC TO 65:PRINT
      #3,"":NEXT N:GOTO 2820 ELSE GOTO
      2770
2820 CLOSE #2:IF EOF(1) THEN CLOSE
      #1:GOTO 570 ELSE OPEN BT$ FOR INPUT
      AS#2:GOTO 2630
2830 '
2840 ' *** pagination subroutine ***
2850 '
2860 FOR N=LC TO 65:PRINT #3,"" :NEXT N
2870 LC=0:FOR N=1 TO 5:PRINT #3,""
      :LC=LC+1:NEXT N
2880 PG=PG+1:PRINT #3,
      SPACE$(ML+30);PG:LC=LC+1
2890 FOR N=1 TO 3:PRINT #3,"" :
      LC=LC+1:NEXT N
2900 RETURN
3000 '
3010 ' **** exit routine ****
3020 '
3030 CLOSE:END
3500 '
3510 ' *****

```



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## POCKET PROGRAMS

### Microsoft BASIC

```

3520 ' *
3530 ' *      error trapping routine      *
3540 ' *
3550 ' *****
3560 '
3570 IF ERR<>52 AND ERR<>55 THEN
    BEEP:PRINT "ERROR";ERR;"IN LINE
    #";ERL:FOR N=1 TO 1000:NEXT
    N:CLOSE:END
3580 PRINT OF$;" does not exist"
3590 PRINT"press <M> to return to menu"
3600 PRINT"press <F> to see a list of
    files "
3610 PRINT"press any other key to try
    again"
3620 AN$=INKEY$: IF AN$="" THEN 3620
3630 IF AN$="M" OR AN$="m" THEN END
3640 IF AN$<>"F" AND AN$<>"f" THEN 3680
3650 FILES
3660 PRINT"press any key to continue"
3670 AN$=INKEY$:IF AN$="" THEN 3670
3680 RESUME 570
5000 '
5010 ' *****
5020 ' *      INSERT YOUR EXTRA OPTION OR *
5030 ' *      SORT ROUTINE - eg sort      *
5040 ' *      from page 181 of Tandy 100  *
5050 ' *      manual after renumbering    *
5060 ' *      lines.                      *
5070 ' *****
5995 GOTO 570

```

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# Business

## ... And All That Jazz .....101

*The fanfare had petered out, the drum roll was missing several beats and Australian Mac fans had long stopped gathering expectantly at the airport by the time Jazz finally arrived. Frank Lee believes the performance, though expensive, was worth waiting for.*

## Alice in Fantasyland .....108

*You wouldn't expect to find mad hatters at an IBM afternoon-tea party, and long white ears and fob watches would probably look incongruous with the regulation blue suit, but most traditionally trained secretaries could be expected to feel some Alice-like bewilderment upon landing in the fantastic secretarial set-up at IBM's new Sydney headquarters.*

## Breeze Retail Software .....112

*It's rare to hear the clang and tinkle of an old-fashioned cash register these days, and the new-fangled machinery looks far more intimidating than your average PC. The Breeze point-of-sale package combines computer and cash register capabilities to produce everything from simple receipts to lay-by dockets, to stock status listings, to management reports ... and so on.*

jazz

## ... AND ALL THAT JAZZ

*Frank Lee cleans his clarinet for a blast of Jazz —  
on a Fat Mac.*

THIS CAT'S ALWAYS had a soft spot for the sweet sounds of New Orleans, through Glen Miller and the more recent jazz offerings of Brubeck and his ilk. I like my jazz cool, and so does Lotus, which has composed this latest integrated performance.

Lotus Development Corporation's Jazz is described as a 'fully integrated business software package'. It was developed for the Apple Macintosh 512 Kbyte personal computer, equipped with an external disk drive and Imagewriter printer. As we'll see later, the combination of the Macintosh hardware and the common components of an integrated package pack quite a blast. For example, the ability to overlay multiple windows, to mark ranges with a mouse, and to share information via the clipboard make this an ideal Mac application area.

Jazz is Lotus's third product introduced in as many years. Its predecessors, 1-2-3 and Symphony, were aimed at the IBM PC marketplace. This latest addition is intended for two business groups: those who have not yet purchased a personal computer, and the Fat Mac owners. Lotus estimates the former market at close to 90 million white-collar business types, and adds that half this group will own a computer within the next five years. At that time microcomputer software sales are expected to exceed \$4000 million.

Jazz is targeted at the small and mid-sized company market rather than the traditional market, which pivots about the Fortune 1000-sized companies. Lotus sees Jazz appealing to business professionals who need to receive information from several sources, and then quickly analyse it for immediate action. The company cites the example of a corporate financial analyst preparing a report on sales and manufacturing operations. He might use Jazz to build a financial model, compile data and make calculations. He could then prepare the final report using Jazz graphics and word processing.

Lotus anticipates that Jazz will boost sales of the Macintosh. For its part, Apple partly credits an estimated double of last year's sales of 300,000 Macs to the arrival of Jazz.

There are no prizes for guessing what Jazz contains. Its five functions are worksheet, word processing, graphics, database and communications. I spent considerable time experimenting with all these, with the exception of the latter. Communications are fine, provided you have the supporting hardware. Alas, the Mac arrived *sans* serial cable. Unfortunately the Mac serial port is not your standard 25-pin D-shell connector — a special cable is required. Nevertheless, I got the 'feel' of the function, if not an actual on-line session with a remote database.

### Presentation

Set aside an evening to browse through the strictly introductory material which comes with Jazz. There's loads of it. The entire package comes in a brightly coloured box. It's packed with goodies. Right on top is a glossy fold-out card labelled 'Start'. It cross-checks what you're supposed to find in the box, how to start up the primer lesson, and how to start up Jazz.

A black plastic 'portfolio' is designed to hold a disk wallet, the Jazz handbook, primer and quick-reference guide, plus your work in progress. It's a nice presentation, although I found the six-place disk wallet less than convenient. For one thing, the plastic slots are a really tight fit. Secondly, it's easier to keep the disks in a simple microdisk tray beside the Mac.

The disk wallet and four disks are in a plastic tray at the bottom of the box. The disks themselves are in a cardboard pack inscribed with the usual warning about what your opening of the box entails. It also carries the rather peculiar notice that "(Lotus) retains ownership of all copies of Lotus software." Rather odd, since you just bought it. I guess what they are really saying is that they retain the copyright of the product, but you 'own' your purchased copy, including the media. I dunno — it's all a bit weird. It's also copy protected. That's why you get both a 'program disk' and a 'back-up disk'. The other two disks are the 'primer disk' and a 'start-up disk'. More on these later.

Other goodies in the box include a con-

version document, a customer assurance plan, a Jazz update booklet, and some spare disk labels for your work disks. The conversion document explains how to convert your 1-2-3, Multiplan and Symphony worksheet files to Jazz format.

On the whole, an impressive non-intimidating presentation, with all the excitement of Christmas.

### Running Jazz

To run Jazz you need a 512 Kbyte Mac with an external disk drive. It doesn't make much sense having a word processor without a printer, so the Apple Imagewriter isn't really an optional extra. Other options include a suitable modem and numeric keypad. With the machine turned off, you pop the start-up disk into the internal drive, and the program disk into the external drive. The Mac is then switched on, and after much ado on the disk!... the Jazz icon appears. You 'double click' this icon, then select 'open' from the file pull-down menu, and you're playing Jazz.

As a tyro, I chose to start with the tutorial system. For this you substitute the primer disk for the start-up disk in the internal drive before switching on the Mac. The start-up disk is where you would normally keep your working documents and associated files. The primer disk has sample documents already in place. They can be viewed using the normal Mac Finder procedures.

Incidentally, having used a Mac for a few weeks earlier this year, I took a gamble and tried the system without referring to the documentation. A risky move, but it's hard to crash Mac software. I found the icons self-explanatory, and nearly all the instinctive moves I tried had the expected results.

### The Primer Session

The Jazz primer introduces Jazz-playing in each of the five applications (or 'functions'). It's clearly designed for integrated systems software novices, although it presumes some familiarity with the Mac itself.

The primer contains 11 lessons in seven chapters. There are corresponding files on the primer disk containing sample worksheets, word processing documents and ▶



database records. It's intended to bring you to the point of being able to make effective use of the Jazz handbook. Give yourself a short working day to take these lessons.

The primer casts you as the manager of a movie theatre. As such, it shows you how to use the worksheet to track ticket sales, how to analyse sales trends with graphics, how to write a press release using word processing, and how to catalogue and find information on films with the database

application. Finally, you're shown how to check the stock market with the communications function.

Jazz builds heavily upon Mac concepts. You open windows in the usual way. These can be expanded, contracted, shuffled and slid around the work desk. Jazz commands are on menus on the standard menu bar. When you're in the middle of an activity preventing you from choosing certain commands, those commands are dimmed on the menu.

After selecting 'open' from the file menu you are presented with a number of lesson options as shown in Figure 1. (The stray file 'forms1' is one I forgot to delete.)

Lesson 1 is a partially-completed worksheet. The primer explains how to select cells (it's so easy with a mouse), how to enter and edit text and numbers, and how to copy individual cells or a range of cells with 'copy' and 'paste' from the Edit menu. The marking of a range, whether a row, column, or block, is now delightfully sim-

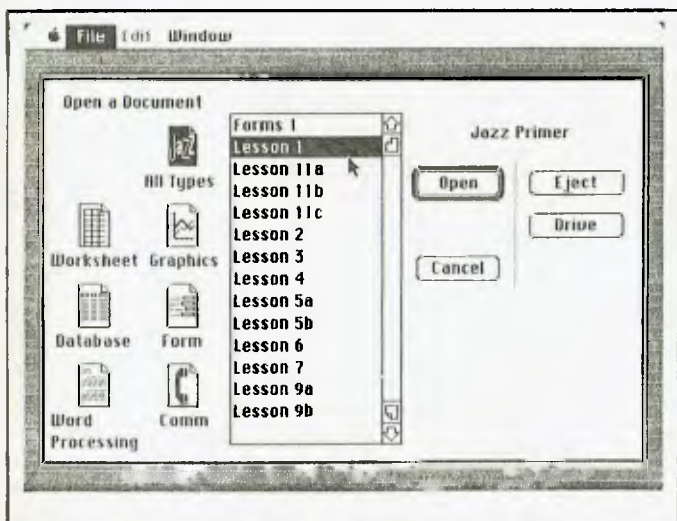


Figure 1. The list of lesson documents which greets the primer user. The required lesson is first highlighted, then opened by clicking the word 'open' in the 'dialogue box' on the right of the screen.

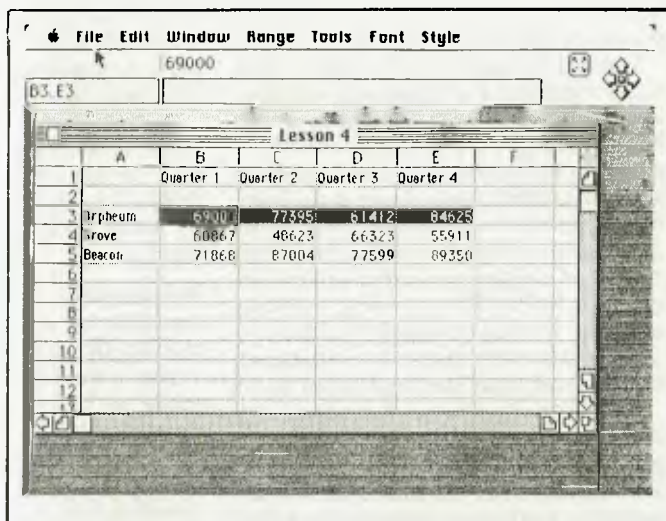


Figure 3. Lesson 4 is a simple worksheet showing quarterly sales for three movie theatres. The highlighted range will supply the data for the first graph to be plotted.

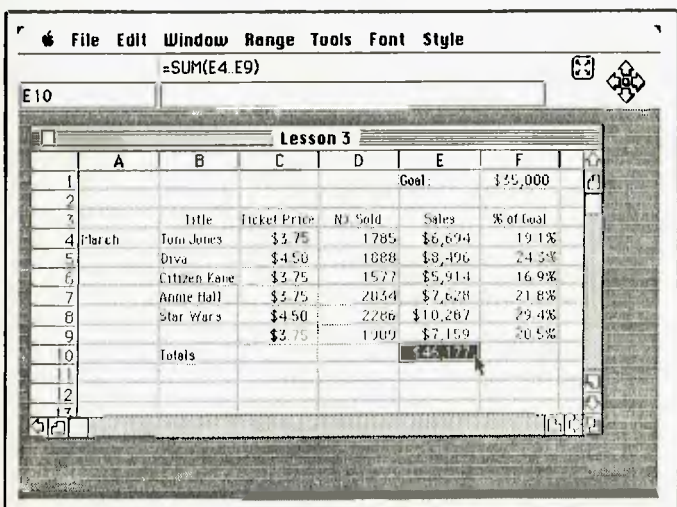


Figure 2. The sample worksheet after reformatting three columns. Note the formula for the highlighted cell (E10). At the top right of the screen is the 'end navigator'. It acts like a cursor cluster, and permits long-range jumps. The 'corner navigator' to its left enables you to cycle around the corners of a selected range at each click.

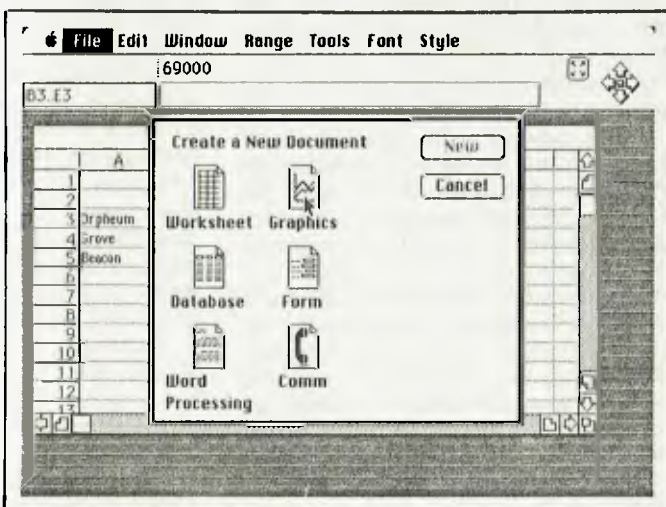


Figure 4. On selecting 'new' from the file menu, this dialogue box overlays the worksheet. You may now start on any of the other Jazz functions by clicking the appropriate icon.

ple. You just mark the top left cell of the range, then 'drag' an outline box down to the bottom right cell. On releasing the mouse button the range is highlighted and the normal range specification is shown automatically in the 'selection box' area at the top of the screen. When 'cutting' or 'copying' a range, the complete range is set into the 'clipboard'. This is especially useful for transferring information between functions, as well as within the same function. Lesson 1 also shows you how to save your current worksheet in a separate file.

Lesson 2 introduces the use of formulas and some of the available functions. There's nothing really new here, apart from a cute way of distinguishing between absolute and relative cell references. There's an 'absolute' icon, which is available when entering formulas. Clicking this changes the cell reference. Apart from this feature, all else seemed pretty orthodox.

Lesson 3 builds upon the two previous lessons. It adds enough information to enable the beginner to make effective, if not expert, use of the worksheet function. In particular, it shows how easy it is to specify a format for a selected range, how to widen or shrink columns and insert rows, how to navigate rapidly around the worksheet, and how to take a hard copy of the finished product. The screen shown in Figure 2 is a result of some of these actions.

Formatting a range is done by selecting 'format' from the Range menu. In the case of the ranges C4 ... C9 and E4 ... E10, we've

*The primer casts you as the manager of a movie theatre. As such, it shows you how to use the worksheet to track ticket sales, how to analyse sales trends with graphics, how to write a press release using word processing, and how to catalogue and find information on films with the database application.*

selected 'currency' and adjusted the number of decimal points as appropriate. The range F4 ... F9 is in percentage format. The formula used for this range is the value in the cell to the immediate left divided by the value in absolute cell F1. Note the use of the sum function for cell E10 (highlighted).

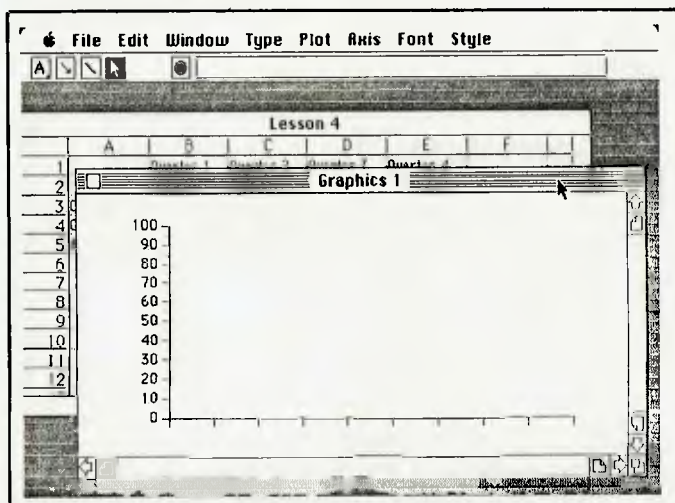
Printing any document, including worksheets, is done by selecting 'print document' from the File menu. You also need to fill in the details for the 'page set up' and

'print selection' from the same menu. Here you have a wide range of choices. You can also take a screen dump at any time by pressing SHIFT-COMMAND-4 with the caps-lock key down.

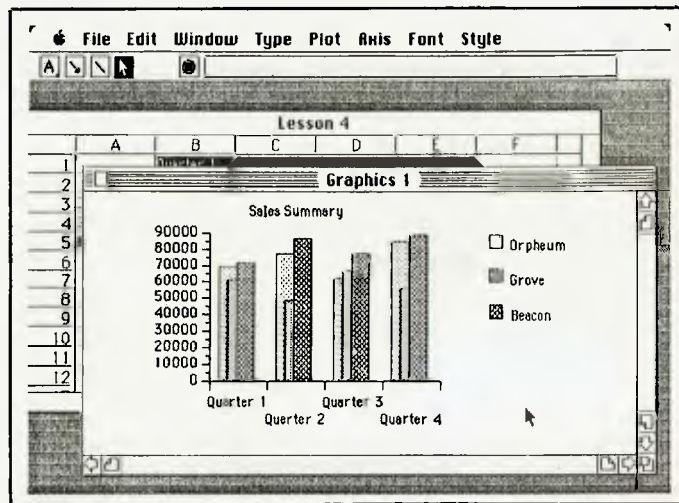
Lessons 4 and 5 introduce the graphics subsystem. The document 'Lesson 4' is a simple worksheet showing quarterly sales for each of three movie theatres. It's shown in Figure 3, with the figures for the Orpheum highlighted. By selecting this range, we can later use graphics to plot the data.

With the worksheet displayed, we next select 'new' from the File menu. Figure 4 shows what happens. Five icons are presented for selection, indicating that you can now work on any of the other applications while still in the current worksheet. We choose graphics by clicking the corresponding icon, then the word 'new'. The result is an empty graph (see Figure 5) with the default name Graphics 1. It overlays the Lesson 4 worksheet. Notice the new set of menu icons at the top of the screen. The black bullseye under the 'w' of 'window' is the 'plot' icon. It's used to mark one of the graphs for identification.

The Plot menu provides the means for creating line graphs, bar charts, stacked bar charts, overlapped bar charts and pie charts. In Figure 6, we've added axis notation, a general title and legends to an overlapped bar chart representation. The graph can be shrunk or expanded to fill any required area. It may also be included (via ▶



**Figure 5.** Here's the screen after clicking the graphics icon and selecting 'new'. We're now ready to create three graphs, one for each movie theatre, showing quarterly sales.



**Figure 6.** The four comparative graphs.



the clipboard) in another document. Naturally, it can be printed as a document in its own right.

Lesson 6 introduces the word processor. Using the Mac as a word processor is fine if

you don't mind the keyboard. Frankly, I prefer the IBM PC keyboard (and it's a dog!). Also, I took a bit of convincing that a mouse has any value in word processing. Now I'm convinced that it's much easier to

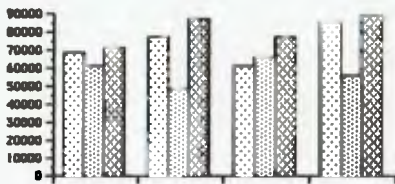
mark text positions with a mouse than using cursor keys. Also, the business of selecting menu options (although many can be reached using the 'command' key) is made much easier with a mouse. The only hitch is you have to find the wretched thing each time after using both hands on the keyboard.

The Jazz word processor has lots of goodies — quite enough to satisfy anyone writing a simple memo, or the author who wants to prepare final masters of his own best-selling, illustrated novel. You can have a swag of different fonts, styles and sizes. However, and this must be said, a document prepared on the Imagewriter looks just like a document prepared on the Imagewriter. It stands out like a sore thumb. I'd really like to see the Mac supporting a regular daisywheel printer. The ability to insert different typefaces does not, in my opinion, warrant the use of a dot matrix printer for business correspondence. On the other hand, if you want to include graphs and/or sections culled from a database or worksheet, then you can't avoid the Imagewriter. Daisywheels just won't do it.

The word processor smacks of Micro-soft's Word. Many features are similar. But one of the best (and unique) features is Hotview. You can use this menu item to place a graph or worksheet range in the document in such a way that subsequent changes to the data from which the graph or worksheet was derived result in the

John, Linda, and Steve:

The following graph summarizes the sales results for 1984.



These were derived from the following data:

Orpheum	69000	77395	61412	84625
Grove	60867	48623	66323	55911
Beacon	71868	87004	77599	89350

This was a good year. Let's keep it up.

Figure 8. A memo drafted with the word processor, and into which a scaled down graph and part of the worksheet shown in Figure 3 have been inserted. I take the blame for this example — I should have included axes and legends in the graph and column headings in the worksheet. But I think it makes the point.

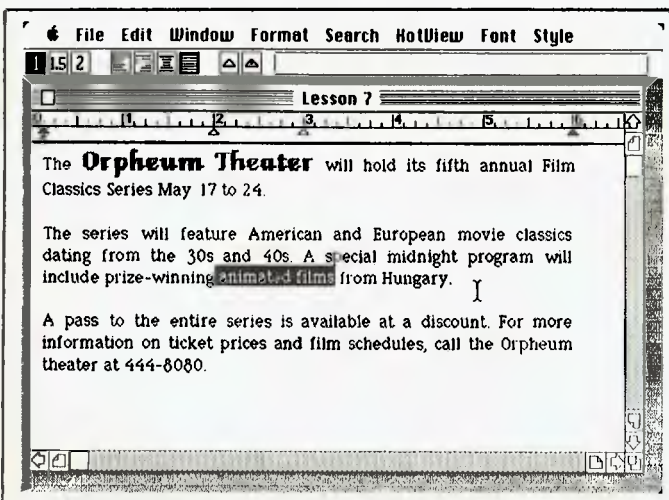


Figure 7. A document being prepared with the word processor.

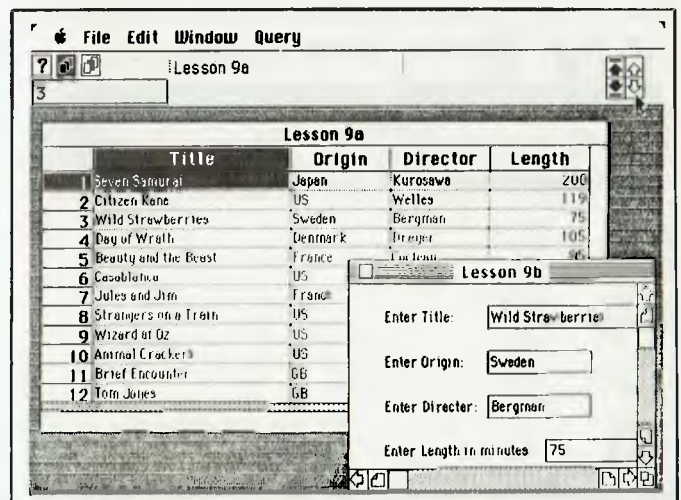


Figure 9. The sample database with a selection form overlaid. The data in the form corresponds to record 3 (see the record number box at the top left). We reached this record using the arrow icon (record navigator) marked by the mouse's pointer. The black arrows are for reaching the first and last records only.

Now let's be clear about this. If you're into databases, and you know all about sets and relations and one-too-many relationships, then this is just a nice card-filing system. If you haven't a clue what that jargon means, then this is a database sys-

Lesson 9 explains how you can sort (with multiple fields, yet) and search for records with specific criteria. Wildcard searches are supported. The search facility is really a query mode system. I couldn't find out whether I could build a separate database from records selected from the original. Figure 9 shows a more complete

You'll need plenty of brass for all this jazz — it costs \$895 — but it's not out of step with other personal computer integrated systems. The product is carefully and well presented and by a group which knows the value of really developing a product before putting it on the market. Jazz is distributed in Australia by Imagineering, PO Box 558, Broadway 2007, (02) 212 1411. It has the smell of success. □

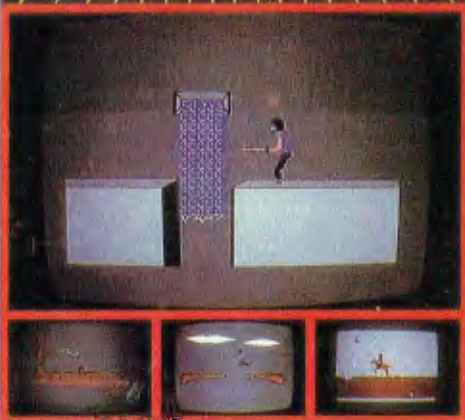
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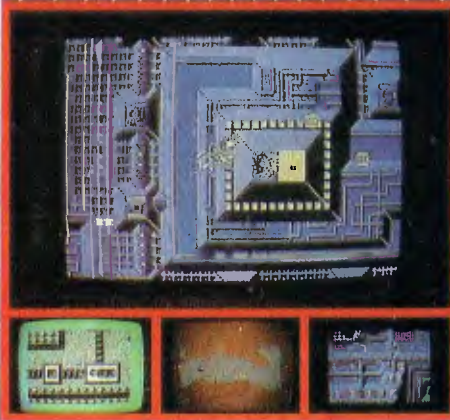
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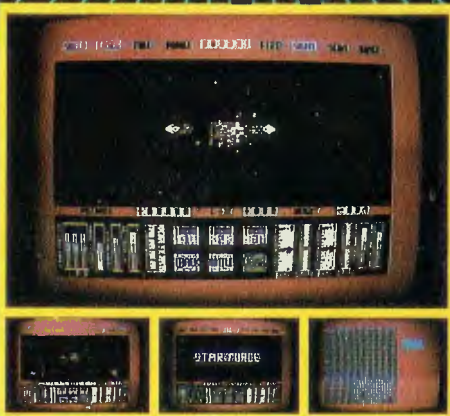
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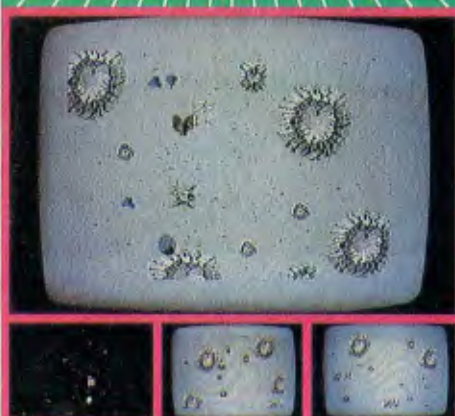
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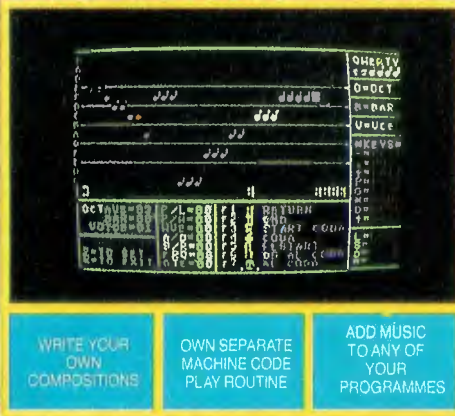
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# ALICE IN FANTASYLAND

## — Secretaries meet Technology

ON HER FIRST day at work as a secretary, Judith made the office tea for the partners, answered a few phone calls and passed on the more difficult questions to her superior. Later that morning she looked at the routine for writing letters, occasionally stared out the window from her desk (on which sat an electronic typewriter made by the same manufacturer as the one she had practised on in secretarial classes), and learnt how to file the finished documents. She left for her rush-hour train when the phones stopped ringing at about 5 pm, knowing there would be much more of the same the next day, and for the rest of her working career.

In an office not many miles away, Suzy Lee wrote several letters on her electronic workstation, checked for messages and sent a telex over the internal mail, looked up her appointments' scheduler and noted an executive meeting in the conference room at 3 pm, for which she would have to check the audio-visual presentation arrangements, and before leaving the office that afternoon ordered cassette video tapes for the next day. "Rather like being a movie producer," she thought, as she walked to the company car pool.

Fear not — the steamy prose above does not mean this *Your Computer* article is turning into a *Woman's Whatsit* romantic novel — although the names are fictitious.

### Star Wars are Real Life

"The fact is that girls who come from secretarial and other training colleges and look at the type of work we do here think it's a fall-out from Star Wars." This real-life comment was heard from Inge Leibnitz, secretarial services manager at IBM Australia's palatial new \$77 million headquarters complex in the 26.2 hectare gum tree reserve of Cumberland Forest, West Pennant Hills, a good half-hour drive from the office canyons of North Sydney.

Although this article was researched during the big shift of personnel from IBM Australia's city office beehives to a secluded, open-plan, rustic setting, this company is not the only one to introduce the latest advances in electronic technology to the normal office routine. Wang, ICL Au-

*You might expect IBM to be at the forefront of office automation, computerised communications and general high technology, and you'd be right. At the company's new Australian headquarters in Cumberland Forest, just outside Sydney, the secretaries' duties were among the first to be radically changed by the silicon revolution.*

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stralia and Digital Equipment are also among leading-edge innovators with various degrees of automation, as is a growing number of large corporations, including banks and other financial organisations.

It isn't necessary to be a computer company to be in the vanguard, but it helps, and IBM Australia has gone about as far as is possible in mid-1985. By mid-1986, when the administrative complex is scheduled to be completed (probably with an adjoining Asian regional training centre), and the staff of executive and professional workers will be in excess of 3000, IBM Australia could be one of many companies using technological secretarial services which not long ago would have been straight out of Disney's Fantasyland.

### Antennae No Advantage

Technology-trained secretaries don't go around wearing antennae above their hairdos, but they do need to have a touch of organisational proficiency and consider-

able experience in the electronic and communications areas beyond the typewriter or word processor. People who are training through conventional courses are not disadvantaged, according to Ms Leibnitz; they are still learning the fundamentals of office routines, and need only three to five days to adapt to the latest electronic methods. "But until they see what is actually happening in the office of today, they don't believe it," she added.

There are 10 communications centres around the IBM Australia complex, each one containing a processor for the 8100 minicomputer system — the basis for IBM's office automation implementations for word processing, office communications and network printers, which can be used concurrently by the secretaries in all departments.

In addition, there are photocopiers, mail sorting holes, waste bins which are security-protected against tampering, stationery and other equipment for general use. According to Leibnitz, these centres are located away from distracting noise from computer operations in the main office areas, and also provide a central point for delivering and collecting mail, and holding all other equipment and supplies.

"The secretarial services have been planned to improve productivity for each of the four floors in the complex, and to provide secretaries with an interesting working environment," said Leibnitz. The workstations are clustered in the shape of a square so the secretaries can communicate easily with each other and share workloads.

"We have moved away from the system whereby secretaries spent a large portion of each day keying in text. The prime task of secretaries at Cumberland Forest is to be responsible for managing the information and communications within their area. This makes the office more efficient, and provides varied and satisfying work for the secretaries. By grouping them together they know what is going on, so if one of them is away from a workstation or at lunch, another can quickly take over."

Of course, relatively few applicants manage to join firms of such size and scope as IBM Australia. They are picked after a ▸

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## ALICE IN FANTASYLAND

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*Secretarial workstations at IBM's Cumberland Forest headquarters. The office design allows secretaries to make the most efficient use of their skills, while providing a pleasant working environment.*



# ALICE IN FANTASYLAND

selection process which takes into account not only their educational qualifications and previous practical training for the job, but also any career ambitions. Although some look for eventual transfer to executive positions, many prefer to remain in secretarial capacities where they are responsible for ensuring the smooth running of corporate administration and individual management operations.

The usual requirement for a career job is a university or equivalent degree, with a typing speed of about 40 words a minute, followed by about two years in the secretarial echelon. A permanent secretarial training centre has been set up at Cumberland Forest, mainly for staff working in office systems in all areas of IBM.

## Emancipated from the Teapot

A new arrival soon notices certain basic changes in the organisation of 'technological' secretaries, who are emancipated from the tea and coffee-fetching routines, the picking up of the boss's dry cleaning,

*"We have moved away from the system whereby secretaries spent a large portion of each day keying in text. The prime task of secretaries at Cumberland Forest is to be responsible for managing the information and communications within their area."*

the car parking, the clearing of mailboxes and, surprisingly at first, the writing of short memos for management. At IBM Au-

stralia, where the aim is to have a workstation which can access the entire computing network for data and word processing on every executive's desk, managers use their own keyboards and the internal mail for short messages such as the two-line memo which used to be dictated and then typed by a secretary. They will also soon have digital voice synthesis telephones to aid their personal communications. So "Miss Jones, come and take a note" is a dying phrase at IBM.

Managers also no longer have individual secretaries, and the concept of the typing pool has been abolished. Eleven secretaries are now allocated among the four section areas, with two more for the company's directors. Should a manager require a particular service, there is a secretary available and trained for it, whether it be processing a long document and transmitting it overseas, or arranging for an international teleconference (which can take place between three countries simultaneously). ▽

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According to Leibnitz, the secretaries access more than just the word processing system. "They need to be able to communicate with IBM offices worldwide. Secretaries are also trained in specialised jobs such as operating an IBM Displaywriter word processor, or the IBM Personal Computer. We try to match the skills of each secretary with the department she is supporting."

## Communicating Inside and Out

The standard IBM in-house communications system is PROFS (Professional Office System), which allows staff in Australia or overseas to correspond with each other over the computer network. By the end of this year, about 3000 desktop terminals will be installed at Cumberland Forest, and when they are implemented Leibnitz claims the PROFS system will remove even more of the short memos that are currently still being typed by secretaries, as well as reduce the amount of photocopying required. "We don't expect to get to the stage of the paperless office, but secretaries will increasingly find their work involves the management of communications between their executives through computer networking and other techniques, with considerably less time spent at the keyboard."

Probably the ultimate in office communications technology is teleconferencing by satellite, which was recently started between IBM Australia, the United States and Japan. Secretaries are required to know how the teleconferencing equipment works and to be able to run it.

The studio equipment includes three personal computer-controlled video cameras which can be focused on speakers at conference tables or on papers or illustrations which are being discussed, and transmit to a large screen. At one recent IBM teleconferencing session, reproductions of papers under discussion were sent by facsimile to the other international participants so they had actual copies to peruse during the debate. IBM Australia is planning to have three teleconferencing studios in Sydney by the end of the year. "The secretaries have to be able to set up all this equipment, and have everything ready for all the people taking part," said Leibnitz.

Secretaries also have to be capable of organising the IBM Cumberland Forest conference rooms, which contain a number of technological devices — even extending to the external window shades,

*IBM's Rolm phone system is designed to handle outgoing and incoming calls without the need for secretarial intervention.*

which are automatically controlled by sensors which move the shutters in synchronisation with the rotation of the sun to keep the room temperature even. A modern electronic conference room includes a speaker's dais with a bewildering array of pushbuttons that work a personal computer, visual display monitor, video cassette player, overhead and carousel slide projectors, microphone and sound effects, lights, and movable screens for a variety of transparencies and other graphics aids for demonstrations and lectures. The secretaries not only have to be able to set up the rooms for meetings, but may also be needed to assist with the preparation of slides and other visual material, as well as write reports and abstracts of conference discussions on word processors.

## Digital Phone System

The telephone switchboard to be used at Cumberland Forest will be based on the US Rolm digital systems with voice synthesisers. Although the IBM Corporation recently purchased the large Rolm Corporation communications firm, the equipment is being obtained through the Australian distributor, Plessey.

Until the Rolm phones are installed, secretaries at Cumberland Forest are using the Audio Distribution System (ADS), driven by a Series/I computer linked to the

PABX telephone equipment. According to Leibnitz, the ADS system has eliminated the interruptions caused by taking messages and allowed secretaries to concentrate on other work.

Staff sign on to ADS by keying in their names and a password. A recorded voice informs the caller of any waiting messages, and the user can respond, save or erase them. If a caller dials another number which is unanswered, the phone rings five times before a recorded voice asks for a message to be left. Users who are going away for any time can leave a message by recording where they are, when they will return and an alternative person to speak to. The system is designed to handle outgoing and incoming calls without the need for secretarial intervention.

The Rolm phones due to be installed in the third quarter of the year will add a number of features, particularly the digital handset, which enables the phone to be connected to a computer without an intervening modem. It also has programmable keys which enable users to set the device to specific functions, including redialling local and overseas calls and making conference calls. More advanced models will enable secretaries to link phones in overseas communications networks.

There are many other areas where technology will supersede much of the manual everyday work carried out in most offices. Although schemes such as those at IBM Australia may initially seem too complex and expensive for the smaller office, many of the ideas will be transmuted in practical form for medium-sized applications over the next couple of years. Some will relieve time-consuming tasks, while others will broaden the range of the office environment and provide more interesting work patterns. □



*The computing centre control area.*



# BREEZE RETAIL SOFTWARE

THERE IS a number of accounting packages on the market for general small businesses — Attache, IAL, IMS, Sybiz, HiFinance 3, you name it — but they are often of little use to the retailer. Few retailers can afford to spend hours keying details of cash transactions into a system just to balance the books or update an inventory system.

However, there is one way this information can easily be entered into the system: at the point of sale. The cash register has to at least have the amount of a transaction entered into it, and these days most accept department or stock codes, amount tendered and other details. Since the sales person is used to keyboarding increasing amounts of data, it makes sense to upgrade the system one stage further.

This is the philosophy which has been applied by Breeze Software in its retail point of sale package. Replacing the cash register with a PC makes possible the capture of more information as the transaction takes place. It can extend the simple capabilities of cash registers to handle COD, laybys, account sales and more complex transactions — but it can do much more than that.

The same PC in a small retail store, or another PC in a larger setup, can also handle inventory management, debtors accounting and management reporting. For retailers with multiple stores, retail chains or franchises, the system can be used to set up a phone-based network which will automatically transmit daily sales figures and stock movements to head office.

To see how all this can be done, let's look more closely at the Breeze package itself. The hardware required is an IBM PC or XT (or compatible), an Epson-type printer, and a solenoid-actuated cash drawer, which connects to the PC through the RS232C or cassette interface.

## Not Intimidating

The basic software is not very intimidating; it is supplied on three diskettes, including a tutorial which can be used to train operators. Installation is extremely simple, particularly on a hard disk, and the instructions explicitly direct the user to create the appropriate subdirectories and copy the files into them. The only difficulty we had was that the system is run from a batch file

*As many people discover when they go into business for the first time, retailing is not that simple. Les Bell examines a package which makes management easier.*

which changes the PATH on the assumption that the MODE.COM file is in the root directory, whereas on our system it's in 'bin' — our command file directory.

We first of all ran the tutorial system. As usual, we didn't bother with the manual but simply plunged in, and once again, we had no difficulties. The system's main menu is the one normally seen by the sales staff, and basically accommodates the main cash register functions: cash sale, COD sale, layby sale, account sale, no sale and payments for COD, laybys and accounts. Also on this menu are some other options: pay out of drawer, pay into drawer, cash a cheque and management functions. The management functions are only accessible with the appropriate password.

At first, we were worried about the time required to key in data on the PC compared to a cash register, but after a little practice, familiarity sped things up. It's perhaps not quite as quick as a good cash register, but its displays are much more informative and accurate. All the same, I wouldn't put this system on a supermarket checkout.

For example, entering a cash sale requires the operator to enter the customer name and address, then enter the product code for each item in the purchase. The system will automatically supply the product description and price, but the operator must then enter a quantity, discount rate and shipping charges. Like most cash registers, the system will prompt for an amount tendered, calculate the change and then print a sales docket, which is much more detailed than the typical cash register docket.

Items purchased are listed with their

prices, quantities and extensions, followed by the total amount, amount tendered and change, followed by the sales person's name and two lines of 'message of the day'. Account transactions can show the account balance and other details.

While the system is least efficient at handling cash sales (at least, from the waiting customer's point of view), it comes into its own when handling more complex transactions, such as laybys, COD sales and account sales. When these sales are made, entries are made in the appropriate journals and are only cancelled when payment is complete.

A particularly nice touch is that all transactions generate dockets on the same three-part stationery. This eliminates the expense of multiple printers or the inconvenience of changing stationery; it also removes the expense of multiple forms. While the dockets are smaller than most business forms, they are perfectly appropriate for use by retail businesses.

The transaction types are well suited to the typical small (and larger) retail business, allowing, for example, payments to be made from the cash drawer, account payments and the like.

## Management Functions

The management functions menu, which is only accessible with the appropriate password, is concerned with payments, file maintenance, credit management and reporting. Reporting is especially important for the retailer. While some small retailers seem to have a gift for intuitively knowing at all times what stock is moving and what is not (and should be quit), most have to work at it.

The reports produced by Breeze will give a retailer the information needed to run his or her business properly. As you'd expect, the Breeze software is particularly strong on inventory management. A variety of inventory reports is available, including a product master file listing (products may be grouped, and associated with particular departments), stock receipts, orders and adjustments, a stock status listing and a price list. Perhaps most useful to a 'hands-on' retailer is the product sales analysis, which shows quantities sold, at retail and cost prices, with dollar and percentage margins, on a daily, week-to-date, month-to-date and year-to-date basis.

## Management Functions

- COD Credit
- Layby Credit
- Account Credit
- Account Journal
- Credit Cash Sale
- Stock Receipts
- Stock Orders
- Stock Adjustments
- Maintenance
  - Reports and File Maintenance
  - COD Customer Maintenance
  - Layby Customer Maintenance
  - Account Customer Maintenance
  - Product Maintenance
  - General File Maintenance
  - Stock Journals Listing
  - Stock Reorder Report
  - Stock Status Reporting
  - Product Sales Analysis
  - Product Price Listing
  - Stocktaking Report
  - Today's Totals/Balance Till
  - Account Customer Aged Trial Balance
  - Account Customer Statements
  - COD Deliveries Listing
  - Layby Customer Aged Trial Balance
  - Calculate Overdue Charges
  - Bank Deposit Report
  - Backup and Reset Functions
  - Customer and Product Enquiry
  - Finish a Shift for Till Balancing
  - Customer and Product Enquiry

Table 1 Management functions and menu structure.



Other reports can be useful. For example, the system stores all sales staff names, together with their commission rates, and will calculate their commission automatically (although it might be more useful to associate different commission levels with different product groups rather than different staff, in order to place more emphasis on certain product lines).

Cash management is handled neatly by the system, with the ability to close off tills at the end of a shift and balance them. The system will also produce a bank deposit slip which lists cheques with drawer name, bank, branch, number and amount, as well as the totals for cash, Bankcard, Visa, Mastercard, and so on.

The other major area of concern to most retailers is accounts receivable, or debtors, or credit management — that is, potential bad debts. The problem is that while it would be nice to refuse credit and work on cash or credit cards only, the extension of

credit to customers brings in business, and keeps customers coming back. Against this the retailer must balance the risk of bad debt and the increased workload of keeping the books.

The Breeze system will manage credit transactions well. Credit sales are obviously entered at the cash register so that everything is right up to date on a daily basis. The system will produce statements at the end of the month, complete with tear-off remittance advice (this seems to be about the only other special stationery required). And of course, a monthly report of aged debtors (what a wonderful image that conjures up!) is also produced. Unless I missed something, the system doesn't produce letters requesting payment of accounts, but that's not likely to be a problem for most retailers.

## Bigger Operations

So far, I have looked at the system from the

point of view of a small retailer with a single store and maybe a couple of sales assistants, with a single cash register. The typical suburban dress shop, in fact. But what about bigger operations?

These fall into two major categories, and Breeze has covered both. The first is the larger single store which requires multiple cash registers and perhaps another PC in the back office for management functions. The second is the chain of stores (like some hardware and pharmacy chains) or the franchise chain, which is becoming more and more popular in Australia.

The first situation is neatly handled by a local area network and Breeze's 'Multi-User Point of Sale Software'. This allows multiple diskette-based computers, operating as cash registers, to access central data files on a hard disk-based machine, which will usually be in the back office. This machine is typically used for management functions and reporting. ►



# BREEZE

The network used is PC-Net which, while it's not the flashiest network around, offers adequate performance for this application. Judging by the technical notes in the documentation, Breeze has had a lot of experience with this system and has discovered a lot of the pitfalls the hard way. I'm fairly confident it has this system working well, although I haven't seen it.

Once installed, the system operates transparently, as though it were a single-PC implementation. There are a few extra concerns about ensuring that all terminals are configured in compatible ways, but once set up, everything is very straightforward.

The second group is handled by Breeze's 'Inter-Computer Communications Facilities'. This software, together with suitable auto-dial/auto-answer modems, links the remote sites through periodic (usually end-of-day) transfers of data.

This is not limited to the obvious transfer of stock movements; virtually any data in the system may be automatically trans-

ferred, including product file changes, sales and collections summaries to head office, customer account information and general messages, memos or instructions.

This opens up a number of possibilities for retail chains and franchises. For example, account customers can purchase from any or all stores, with one statement being centrally produced. Inventory can be centrally managed and ordered, giving improved price breaks as well as better stock distribution.

## More Options

There are a couple of other very significant options for this system. First is a barcode reader, which significantly speeds entry of stock codes, while the other is a magnetic card reader, which will expedite entry of customer details for account customers. Both these options are quite affordable, even for small retailers.

Breeze has a number of installations in place already (primarily in the Melbourne area, although sales in other states are starting to increase), so the company has

wide experience with all kinds of retailers and has adapted the package to different requirements. Users include a Brisbane taxi company which manages a chain of service stations, a bedding store franchise, a ship's chandler and all kinds of other retail operations.

In summary, the Breeze Generalised Point of Sale Software is an excellent package for virtually all sizes of retailers (except the Myers of this world). It is affordable for all but the very smallest of retail outlets, but can be later expanded to multi-terminal operation and even to cover multiple stores or franchises.

The Breeze software far outperforms general accounting software in meeting the needs of retail businesses. Its reporting is designed to meet retailers' needs, and the data capture at point of sale ensures the information resource is adequately constructed to provide those reports.

Any retailer who doesn't check out this software has rocks in his head. □

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  - B. Partnerships
  - C. Sole Trader
2. To compare results with budget and last year.
3. To produce the financial reports:
  1. Manufacturing
  2. Trading
  3. Profit and Loss
  4. Balance Sheet
4. To transfer the totals from the various ledgers, Debtors, Creditors sales etc.

#### DEBTORS SYSTEM SYSTEM OBJECTIVES

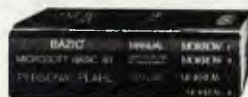
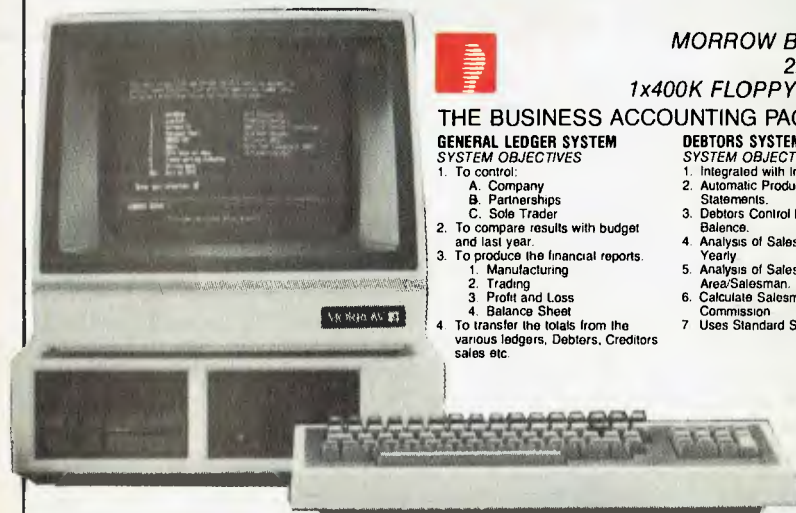
1. Integrated with Invoicing/Stock.
2. Automatic Production of Statements.
3. Debtors Control by Aged Trial Balance.
4. Analysis of Sales Monthly & Yearly
5. Analysis of Sales by Area/Salesman.
6. Calculate Salesman's Commission
7. Uses Standard Stationery

#### INVOICING/STOCK SYSTEM SYSTEM OBJECTIVES

1. To maintain and control stock inventory levels.
2. To produce a detailed invoice or Credit No. on-line.
3. To analyse the sales and profitability of all stock lines.
4. To produce a complete sales tax analysis.
5. To integrate with the Debtors system and update account balances at invoice stage.
6. To produce salesman and area figures including a commission statement.

#### CREDITORS SYSTEM SYSTEM OBJECTIVES

1. To produce a creditors system which can operate: Integrated with the Stock System.
2. To maintain and control the Accounts Payable section of a company.
3. To control discount available.
4. To make payments to selected creditors by the use of the aged Trial Balance.
5. To produce cheques automatically.
6. To analyse purchases from creditors month and year to date.
7. To produce the necessary totals to transfer to the General Ledger.



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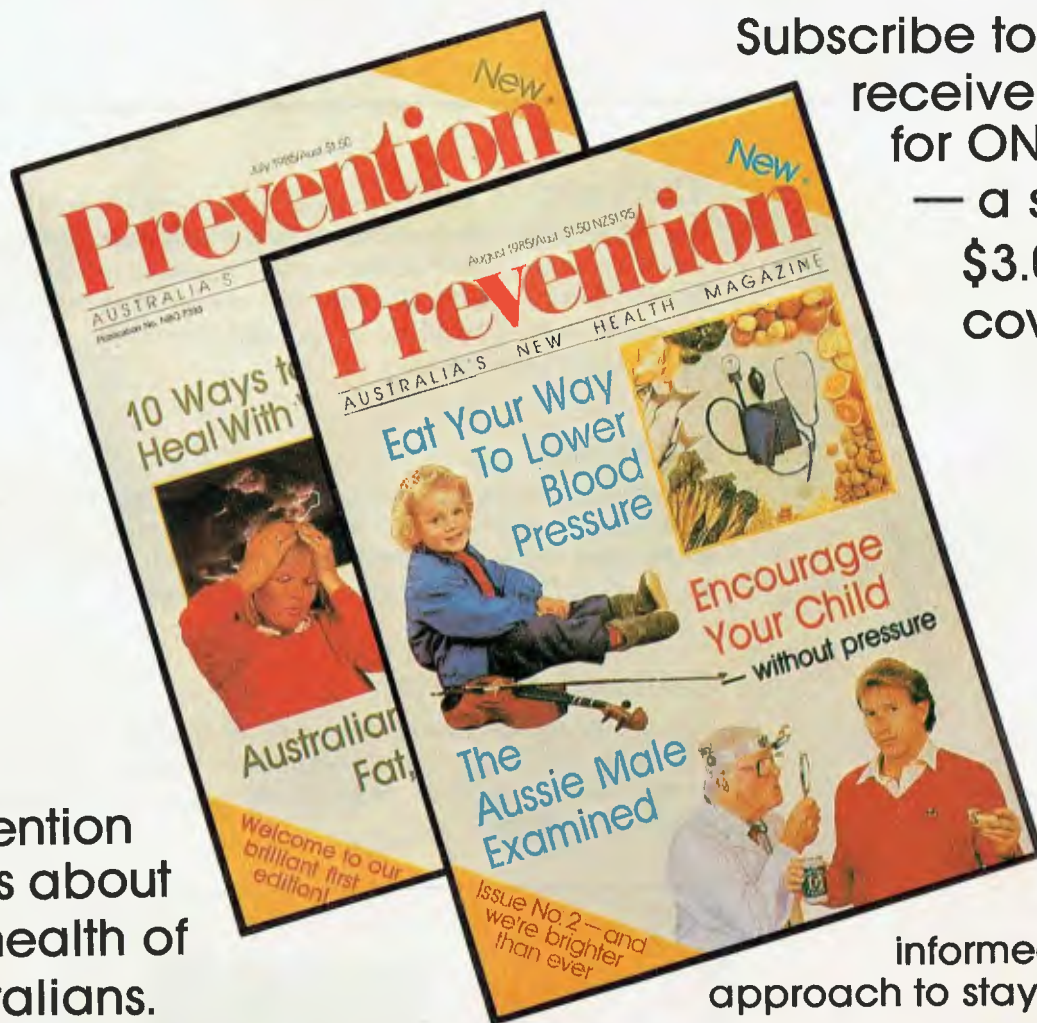
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| ★ Men's health    | ★ Healthy cooking |                 |

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# Reviews

## The Toshiba 1100.....117

*Our Frank's tough. He knows how to handle them thair machines, and 'cos he's wise to all their weaknesses he kin usually resist their more obvious charms ... but this little one sits so nice an' purty on his lap, an' has a good mem'ry for all the things Frank likes ... an', well, it's jus' tuggin' at his purse strings.*

## Bit Bucket.....120

*Wanna hand with the diskwashing? YACkety YACkety YAC — won't those manufacturers ever stop? Remember Flashdance? Now you can see it in print! Did you know NDK got together with JBCC, and they had the cutest NLQ you've ever seen ... Here's the bucket.*

## Commodore 128.....128

*Now let's be serious. Clearly targeted at the small business user, the Commodore 128 also provides an easy upward migration path for C64 owners. Our Commodore columnist considers the merits of this blend of business and pleasure.*

*Commodore's PC 10, reviewed in this month's Bit Bucket, is yet another IBM PC compatible — a YAC for short.*



# TOSHIBA'S 1100 — The Wish List in Your Lap

*Frank Lee adds the Toshiba 1100 portable lap computer with IBM PC compatibility to his personal itty-computer wish list.*

REVIEWING REALLY portable computers is, for me, a perennial pleasure. The leap from minicomputer to desktop was a milestone on the road to personal computing, but the ultimate dream has always been the combination of an extremely lightweight, battery-operated, powerful machine, which could literally go anywhere and run popular software. Today 'popular' means MS-DOS.

So far in these columns I've reviewed the Gavilan (alas, wherefore art thou?), the Dulmont Magnum and the President Roadrunner. I've also used a number of similar machines on behalf of colleagues. All have roused considerable comment in the press, but none have really lived up to my wish list. To date, true portable power has also meant prodigious price. Built-in drives had their cost. So did loads of RAM. So did IBM PC compatibility.

Here is my personal itty-computer wish list: low price, battery power (rechargeable), simple to operate, rugged, a weight of less than 1 kg, a serial port, a parallel port, a decent word processor, low battery warning, an external storage device, MS-DOS operating system, loads of utilities, full documentation, proper vendor support, a decent keyboard and a 24-line (or better) LCD screen with optional video outputs.

The \$2995 Toshiba 1100 comes mighty close. Briefly, it's a battery-operated lap-sized IBM PC-compatible machine with a full 25-line LCD screen and bit-mapped graphics (640 by 200 pixels). In comparison, the \$5000 HP110 has a screen with just 16 lines. The 1100 has 256 Kbytes of RAM (optionally expandable to 512 Kbytes) and a single built-in 9 cm disk drive. It runs MS-DOS 2.11, and sports an 83-key keyboard. As for weight — it swings in at just over 4 kg (about the same as the HP110), which is heavier than I'd like, but

certainly not too heavy for lugging around the countryside in the optional (and stylish) black carry bag. The bag, by the way, has a shoulder strap which can be shortened, allowing you to carry your portable in your hand.

Not all lap computers are this heavy. The President Roadrunner (reviewed January last) weighs just 2.3 kg. Much of the 1100's weight results from the use of large NiCad rechargeable batteries and the built-in floppy disk drive. The weight's a small price to pay for these facilities. In return, the batteries give you up to eight hours operation from a full charge. A low-battery warning light flashes red when it's time to poke in more juice. Another little yellow LED tells you when the built-in disk drive is selected.

The computer is encased in matt beige thermoplastic. While it certainly looks up-market, the finish can get grubby quickly. Everything it touches seems to want to leave its mark.

## **Different Keyboard**

The Toshiba's keyboard is laid out somewhat differently to that of the IBM PC, but all the keys are there, somewhere. Actually, the layout is quite good. There's a big fat Return key, and the two Shift keys are also double-sized. I did have some difficulty finding the relocated asterisk '\*', which I tend to use quite a bit. It's too far away for my liking.

Although the keyboard is slightly tilted, I found it easier to use when the back of the machine was propped up by about 4 cm.

The 1100 has the classic flip-up lid, which contains the LCD screen and conceals the keyboard when closed. A (real) switch on the left of the machine turns power on and off. This (believe it or not) is a nice feature — one which should have been adopted by the Dulmont Magnum designers. If you haven't experienced the

frustrations of trying to turn on or reset a Magnum using its keyboard you won't appreciate the strength of this point. Resetting the 1100 is the same as for the IBM PC — pressing the Ctrl, Alt and Del keys simultaneously. There's no hardware reset button (a pity).

Next to the power switch is a contrast control knob — again, very simple and much easier to use or implement than specialised keystrokes to do the same job. This control is set according to the intensity and direction of the ambient light.

Although reflections can be annoying with an LCD screen, it's not difficult to find a suitable setting, even in dim lighting situations.

The Toshiba's built-in floppy disk drive is located on the right-hand side, near the rear. This is a double-sided 9 cm drive with a massive 720 Kbytes of storage space. You must remember to remove any disk in the drive before moving the computer, as it's likely to fall out and get damaged. It's not a viable alternative to pop the disk back into the drive and lock it after powering down.

## **Bare**

Although the unit has a parallel printer port, the serial port is optional. As originally delivered to Mount Crisis, the machine was disappointingly bare; no serial port or application software, and the sole disk supplied with the machine was the MS-DOS system, without even a BASIC interpreter. More importantly, how was I to use it to write an article without some means for either transmitting the text via modem, or for dumping it to a regular 13 cm disk so that Ron (my President 16-210) could do the transmission for me?

Fortunately, you can fit either another 9 cm or a full 13 cm external drive via the FDD connector on the rear of the machine.

A call to Toshiba assured me of rapid



# TOSHIBA 1100

satisfaction. A day or so later my mailbox contained a bunch of Sony 9 cm disks. One was blank (to make a working system disk). Another held BASIC, Wordstar and some neat engineering tests. Yet another was labeled Flight Simulator — the acid test!

Most readers will recognise that the Microsoft Flight Simulator has become the de facto litmus test for IBM PC compatibility. Of course, it can't check bus compati-

bility, but it certainly covers an awful lot.

Needless to say, it worked just fine. The 9 cm FS disk booted itself, then presented the normal simulator display on its LCD screen. Although this is strictly monochrome (alas, RGB LCD still seems a long way off), the effect is quite remarkable. This is due to the persistence of the LCD screen, which neatly smooths out otherwise jerky screen movements, giving a much im-

proved 'feel' for the display.

All the keys did their FS-assigned thing, although the layout of the function keys (along the top of the keyboard) didn't help when trying to control the flaps and throttle.

The 1100 has a built-in RGB display controller and a standard 9-pin socket on the rear of the machine. Using this connection to a Kaga III RGB monitor, it was possible





# TOSHIBA 1100

to run the Flight Simulator in colour. All that was needed was to flick a display switch on the rear of the 1100, and re-boot the simulator specifying RGB output.

There is also an NTSC composite video output, which would suit most composite monochrome monitors.

Having established that the 1100 has a high degree of IBM PC compatibility, the next trick was to run my standard prime

number benchmark program to determine processor and disk speed. Unfortunately, there was initially no means for getting my PL/I compiler or source code onto the machine. Another call to Toshiba reminded the company of the need for an external 13 cm disk drive and/or a serial port kit. The only external data port on the basic machine is a standard parallel printer port. I have the feeling that somewhere out there is documentation describing how to hook up two PCs via their parallel ports using a doctored cable ... but in the absence of that information, I was stuck with the need for a COM1 port (driven by Modem7) for inter-computer communication.

The next day a courier arrived with an external 13 cm floppy disk drive for the 1100. Saved by the courier! This unit sits beside the 1100 and connects to it via a 60 cm cable. Another external 18 VDC supply provides the juice for the drive. You can't use this device without a power supply. That's hardly a problem because you'd normally only use the 'big' drive for doing the occasional dump. The external drive can be made the 'boot' drive by flicking a switch at the rear of the computer.

My reaction to the asking price of \$879 for the 13 cm drive would be to buy the \$165 serial port card instead. Then I could still do file transfers using Modem7, and at far less cost. Since the additional 256 Kbyte RAM costs \$649, a fully configured 1100 with 512 Kbyte and serial port will run to \$3809. The carry bag costs an extra \$50.

## Power savings

Since most application software (certainly the stuff I use) runs quite merrily in just 256 Kbytes, I'd be happy to part with \$3160 just to have the serial port version. It might seem a lot to pay \$649 for 256 Kbytes of RAM. It's not, when you realise that we're talking about CMOS RAM, which is de-

signed to save on power consumption — the real bugbear of portable computer designers.

With the 13 cm drive it was a simple matter to transfer my PL/I compiler and the source code file PRIMES.PLI to the 9 cm drive. As expected, compilation and linkage took roughly twice as long to execute on the smaller drive compared with the same job on an IBM PC's 13 cm floppy disk drive. The difference is a result of slower access times. But the execution of the resulting program itself took exactly the same time as it did on the IBM PC. In other words, the 1100's processor runs at the same speed.

## Software

Programs supplied with the 1100 (for evaluation only) included Wordstar version 3.3, Multiplan, Advanced BASIC, and the Perfect Series version II. I played around with Multiplan and got good vibes. The Perfect series II worked beautifully, and Wordstar did its expected boring, but absolutely correct, thing. What I did like was the inclusion of a virtual disk driver VDISK.SYS, which let me assign 64 Kbytes of the available 256 Kbytes to drive C.

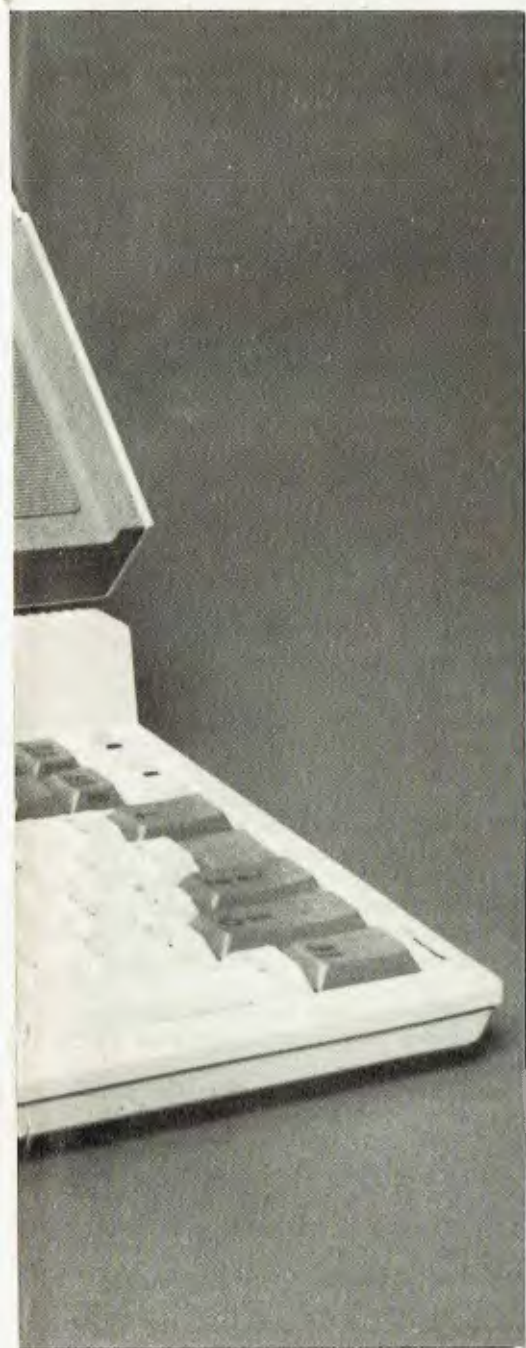
## Documentation

The documentation is a bit spartan. A spiral bound Owner's Manual tells all with a decided Jinglish accent. It includes all the details necessary for adding peripherals, more RAM, and a serial port.

A separate MS-DOS manual is a reprint of the Microsoft DOS manual. There was no BASIC manual — this needs to be purchased separately.

## In Summary

This is one real nice machine. I don't often admit to being tempted to buy a particular brand, but the 1100 is really tugging at my purse strings. If I fall for it, I'll let you know. □



RATINGS:				
POOR	GOOD	V. GOOD	EXCELLENT	
DOCUMENTATION				
EASE OF USE				
RELIABILITY				
IBM COMPATIBILITY				
VALUE FOR MONEY				
VENDOR SUPPORT				



# BIT BUCKET

## FLASHPRINT Version H

**Supplier:** James Tucker and Associates, 42 Turners Avenue, Coromandel Valley 5051.

**Application:** Wordstar enhancer.

**Format:** 20 cm on IBM format SS/SD (CP/M).

**Price:**

**I**t's nice to see Aussie companies having a software bash — and doing it effectively. Top marks to James Tucker for his Wordstar-enhancing Flashprint. It has great potential.

This is an 8-bit Z80 CP/M program designed to run with one of the following versions of Wordstar: 2.26, 3.0 or 3.3. There is a version of the program to suit each corresponding Wordstar version. The review copy sent to us was in 20 cm CP/M format.

The idea is to enhance Wordstar's print function by allowing it to send strings of bytes — any bytes — to the printer. This means that a simple inclusion in the file can generate bit-image patterns on dot matrix printers, among other things. To do this, Flashprint reserves the '@' character as a special prefix to its commands. There are four command types.

'Simple' commands are formed by following the '@' with a single (unreserved) character. What is sent to the printer is determined by a lookup table in the file FLASH.OVR. Facilities exist for specifying this table. For example, the command @U might turn on the underline mode, while @u turns it off. By using the printer's underline mode, you get true underlining between words (not done by Wordstar's ↑PS). Similar (user specified) simple commands might be used to switch between fonts and print sizes. These commands can also be used to send very long sequences to the printer — even your name and address. Chances are, this could be the only command type you would ever need — but there are three more.

The 'translation' command lets you substitute one character for another without the need for the '@' each time it is used. The field of text to be covered by translation is prefixed by '@|' and terminates with '|'. If within this field there is a character in the defined translation table, the translation is performed — otherwise the characters are printed without change. In practice, the entire document would normally be a translation field.

The bit image command is similar to the above, the only difference being that if there is no corresponding entry in the translation table, nothing happens. Bit image fields are enclosed in the pair '@(' and ')'. You would use this command to output predefined graphics characters (such as a company logo) to a dot matrix printer. Again, the software tools are provided to enable you to set up complex graphics in the minimum time.

The 'hex' command lets you send hexadecimal values to the printer. How often have you been frustrated when trying to embed an escape code (iBH) in the text to be printed? Never? Ah, well — you don't need this command; but if you want to, then this is how to do it. For example, the string @<1B 2A 1B 07 00 0A> transmits the raw hexadecimal data between the brackets. Clearly, if this were to be done frequently, it would be better to include it as a 'simple' command.

Setting up the table in FLASH.OVR is a bit of a hassle, but it's a once-only job (for each printer). The job has already been done for you if you have an Epson, Logitech or C Itoh dot matrix printer, and these can be used as models for similar printers.

Flashprint makes no changes to Wordstar's disk files, WS.COM

and so on. Instead, it modifies a RAM copy of the program after relocating itself at the top. Consequently, you can run normal Wordstar at any time just by typing WS at the CP/M prompt as usual. To use Flashprint, you run FLASH instead of WS. FLASH loads Wordstar, modifies the RAM image, then executes Wordstar. That's neat.

A big bouquet to James Tucker for his documentation (printed on a rather fine dot matrix printer with Flashprint). Not only does it look neat, it has to be the most readable document I have studied for a long time. His style is great: entertaining and informative at the same time.

Go sell it, James. Then do it again for the IBM PC. □

## BI-XT-88

**Distributor:** Bi Computer Pty Ltd, Suite 23, 2A Bayswater Road, Kings Cross 2011; (02) 356 2388.

**Compatibility:** IBM PC compatible.

**Price:** \$3480 (with RGB monitor and 512 Kbytes).

**M**ore YAC (Yet Another Compatible). Is there no end? Unlike our American friends, we Australians seem determined to prefer clones to the Real Thing. Maybe it's the Ocker in us, or perhaps the devaluated dollar. The fact is the Australian market is devouring IBM PC work-alikes as fast as they appear.

This Japanese-manufactured machine is presumably designed for OEMs. A careful inspection of the printed circuit board artwork gave no hint of the identity of the manufacturer. This is real 'No Name' stuff. That's not to say generic computers have fewer vitamins than the labelled brand. The fact that Bi Computer (ghastly name) has adopted this hardware and planted its logo on it means the company is prepared to back the product as if it were its own. That's fair enough. My own trusty Ron (a President 16-210) is a case in point, but in his case I know who his Taiwanese ancestors are.

An examination of the Bi-XT-88 supports Bi-Computer's decision to take this one on. I do have a few complaints, but let me first describe the product.

Although its name suggests it is a clone of the IBM PC XT, this is not the case. For starters, there is no hard disk. The Bi-XT-88 sports two Epson slimline floppy disk drives. These are a bit like the BASF drives, with a front panel press-button for engaging the disk. The have been thoughtfully labelled 'A' and 'B'. These drives have no head-lift solenoid, so the head is permanently in contact with the disk. The disk drive motor spins the disk only when reading or writing.

The idea of leaving the head in contact with the disk always gives me the shudders. Should the power go off momentarily, there is a good chance that the disk will be clobbered.

There is another problem with these drives. When the press button is pushed, the disk is supposed to pop out. Some disks don't, possibly due to their thickness. When this happens you'll need a pair of tweezers to grab the disk — fingers are too blunt.

There are 256 Kbytes of RAM on this machine's main system board, which also has room for extensions to the ROM monitor. There is a socket for an optional 8087 numeric processor chip. Of the five system slots, three are occupied. One belongs to the monochrome/colour graphics board (which offers composite NTSC video as well). Another slot is consumed by the floppy disk con-

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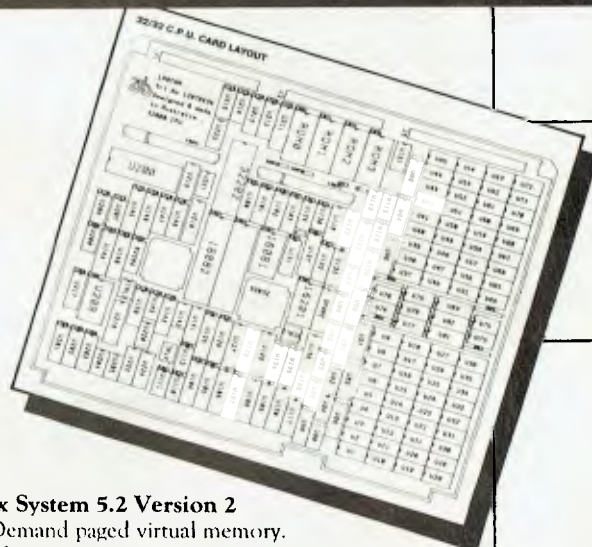
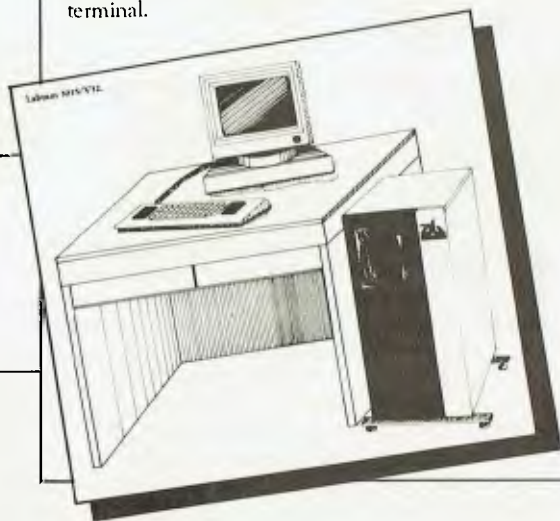
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troller; this card handles the two inbuilt drives, and an external socket allows two more drives to be attached.

The third card is the multi-function card, which adds another 256 Kbytes of RAM, bringing the total up to 512 Kbytes. There is room on this card for an additional 128 Kbytes, but I don't know if the system can use a full 640 Kbytes; there's a good chance it will. The multi-function card also supplies a serial port, a parallel port, and a games adaptor (for joysticks). A second optional serial port can be configured for COM3 or COM4.

The remaining two slots would be devoured quickly if you decided to add a Microsoft mouse and a modem.

The Bi-XT-88 has a healthy 100 watt power supply, but its cooling fan sounds like a jetliner on final approach. It really is too loud.

The keyboard is standard enough; it looks like the IBM version, but it has red LEDs on the Caps Lock and Num Lock keys. It feels softer than that of the IBM PC. The function keys are not in a shallow 'well', which means the Lotus template will not fit correctly. It is plug-compatible with the IBM PC.

One of the nicer points about this machine is the way the lid hinges up for access to the innards. No fiddling with screws — just two press-buttons on either side of the cabinet to release it. Other manufacturers should take note.

The system comes complete with a Taxan Vision II RGB monitor.

Unfortunately, I can't comment on the quality of the documentation or the supplied software — neither were included with the review unit. I booted the system up with my own DOS 2.11 and DOS 3.05 disks, and it worked just fine. The prime number benchmark took the same time as it did on Ron (and hence the IBM PC).

The descriptive product brochure mentions that the MS-DOS disk includes a RAM disk utility. That's a handy feature.

I wish they'd do something about the machine's name.

**Bad points:** No reset switch; disk drives which don't eject correctly; noisy fan.

**Good points:** Neat hinged lid for access; four-layer system board (higher reliability). □

## DISKWASHER

**Distributor:** PandaSoft, PO Box 60, Kallangur 4503;  
(07) 204 4504.

**Application:** Direct disk editor (hexadecimal)

**Target Machine:** John Sands Sega SC3000

**Price:** \$49.95

**D**iskwasher is a debugging utility designed for the Sega SC3000 with a 7.5 cm disk drive. Similar to the old IBM SuperZap program, Diskwasher allows the user to display and optionally modify the contents of any sector on either side of the 40-track disk. The format in which the sector data is displayed is similar to that of CP/M's DDT 'dump' facility. The first (or second) set of 128 bytes of the selected 256-byte sector is displayed both in hexadecimal (sic) and ASCII.

Access to individual bytes is navigated by the cursor control keys, so that the system is almost menu driven. If the screen data has been modified, the sector may be rewritten either to the same or a different sector.

Naturally, a powerful (and dangerous) utility such as this can very easily clobber the disk and your valuable files. Pandasoft is at



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pains to inform users that neither it, nor the distributor, dealer or retailer shall be held responsible for the clobbering of any disk. Under the circumstances, that's fair enough. The company strongly advises users to operate with backup disks only.

Diskwasher is loaded from the Disk BASIC system with the oddball command:

RUN "Disk was.her"

It begins with a neat Pandoft Logo which vaporises and is replaced by a prompt requesting the track number (0 to 39), then the sector number (1 to 16). The first half of the sector is displayed and you are given the option of editing (left arrow key) or of displaying more data (right arrow key).

There seems to be no way of returning to BASIC. Even pressing the Reset key returns you to the Pandoft logo. The only way to exit seems to be to switch off the machine — a bit primitive.

A particular and obvious application for Diskwasher is the resurrection of KILLED files. Provided the disk has not been written to since the file was KILLED, then it is only necessary to restore the directory and File Allocation Table (FAT). The directory sector is on track 20, sector 1 and the FAT is on the same track, but at sector 13. Correction of these sectors can be made by following the information given in the Sega Disk Manual.

The program can also be made to change the pre-programmed text associated with the function keys. On the BASIC system disk, this data is in track 6, sector 15.

Clearly, use of the program presupposes considerable knowledge of the disk operating system on the part of the user.

The preliminary documentation leaves a lot to be desired. The spelling is poor, and the presentation sloppy. Nevertheless, the program might just get you out of a jam. Look at this purchase as an insurance investment. It just might be worth more than you paid for it. ☐

### COMMODORE PC 10

Distributor: Commodore Business Machines, 5 Orion Road, Lane Cove 2066; (02) 427 4888.

Compatibility: IBM PC compatible.

Price: \$3600 (includes monitor and software).

**H**ere we go again; YAC — Yet Another Compatible. How compatible? We'll see. It looks, feels and tastes like a PC. The PC 10 has two half-height BASF 13 cm floppy disk drives and 256 Kbytes of RAM. There are five standard IBM card slots, one of which is occupied by the monochrome graphics adapter. A serial port and parallel port are included on the main system board. The machine is supplied with MS-DOS 2.11 and some interesting utilities. GWBASIC is also provided as standard. There is no games port, nor a port for an RGB monitor. The PC 10 uses the same disk format as the IBM PC, and can interchange disks with the IBM PC. The only program which fell over during testing was the Microsoft Flight Simulator. Good old Sidekick performed correctly, as expected.

I was concerned to see that, apart from the standard DOS and GWBASIC manuals, there was only a superficial 42-page booklet (a 'Users' Manual') describing the actual system. Nowhere could I find answers to technical questions. Could it take the 8087 chip? Can one expand RAM on the system board? The DOS and BASIC manuals were just reprints of the standard Microsoft documenta-

tion, and gave nothing away about the hardware itself.

The keyboard is almost like that of the IBM PC, but not quite. It has a sizeable Return key, and relocates some keys to more traditional positions. I didn't like the juxtaposition of the Alt and Control keys; I found myself inadvertently pressing the wrong one on a number of occasions.

An immediate problem occurs because of the relative heights of the lower disk drive and the top of the keyboard. When the latter is inclined at a normal typing position, it just manages to obscure the drive. Loading disks into drive B may mean having to temporarily move the keyboard, or to raise the computer itself on a thin platform.

While it loads other versions of DOS (for example, DOS 3.05 from the Mitac), the PC 10 would not handle the original (monochrome version) of the Microsoft Flight Simulator. When booted with the FS disk in place, the drive tries to read the disk, then locks up, doing its best to plough a track on the disk. This was bad enough, but I then discovered that the BASF drive will not let go of its prey until the head solenoid is released! Since the drive was locked up, there was nothing to do but turn the computer off in the hope that the disk would not be dongled. Why on earth didn't Commodore provide a simple reset switch, especially with a potential disaster like that?

Inside the beast there's loads of space; enough to install a couple of half-height hard disks, although this would entail fitting a new front panel. Why isn't this computer simply supplied with a front panel with knockouts?

Among the utilities included with the PC 10 is a driver called RAMDISK.SYS. A separate disk (called the 'describe disk') is an extended help facility which goes part-way to filling the gap left by the user's manual. This program describes the steps required to make the RAMDISK effective. All you need do is include 'device=ramdisk.sys 128' in your CONFIG.SYS file. This will create a third 128 Kbyte 'disk', which can be addressed as drive C.

I tried the utility on Ron (my President 16-210), who has 512 Kbytes of RAM. It was a simple matter to include the same driver in Ron's CONFIG.SYS, and to add a few lines to the AUTOEXEC.BAT file to copy Wordstar and BASICA to the RAM disk (now D:). This meant I could now remove those files from my subdirectories, and gain a little (real) disk space.

Also included was an automatic demonstration disk of Wordcraft, a word processing program. I watched this for a while, but was more interested in the driver program, which fed a stream of 'keystrokes' to the target program.

A new utility called XTREE generates a neat display of the subdirectories — neater than that produced by TREE.

Finally, there is a BASIC benchmark program — a simple timed loop using integer variables. This had surprising results. When I ran the program under the supplied GWBASIC it took just eight seconds. This was the same time it took to run it on Ron using BASICA — no surprises there. However, why did it take twice as long using Commodore's GWBASIC when run on Ron? Maybe one of our more astute readers might enlighten me?

Bad points: No reset switch; disk drives which hang on to their prey; doesn't run the Flight Simulator; thin documentation.

Good points: Nice keyboard layout; interesting utilities. □



## JBCC PRINTSTAR 5025 PRINTER

Distributor: Datascape Int. Pty Ltd, 44 Avenue Road, Mosman 2088; phone (02) 969 2699.

Prices (exclusive of sales tax): basic printer \$2268; automatic sheet feeder \$1084; tractor feed \$170; download memory board \$501; serial interface \$212; Fontmaster disk \$360.

**T**he Printstar 5025 is a dot matrix impact-type serial printer with a 24-wire printhead. It is capable of NLO (near letter quality) performance, as well as functioning in high-speed draft mode. It also handles high-resolution graphics; and two colour ribbons can be accommodated.

The word 'serial' in this case applies to the manner in which the printer generates characters, as distinct from a line printer which prints a line at a time. The interface normally provided on this machine is parallel (Centronics standard), although a serial RS232 interface is available as an option.

My initial reaction to this printer was highly favourable, an opinion which was reinforced as my experience with it developed. It is very fast, has superb-quality print, is flexible, and has solid engineering.

The Printstar is from the NDK stable, a firm recently bought by the Japan Business Computer Co Ltd. NDK made its name with high-performance printers, and will no doubt do the same for JBCC.

The unit's appearance is spartan; it has an operator panel with four control buttons and two decade thumb wheels. Two removable panels reveal internal DIP switches for infrequently changed settings. A foam-rubber footprint helps reduce the noise level, which is surprisingly low. It is unlikely you would need an acoustic cage to make it quieter for an office environment, which, by the way, is clearly the intended market for this product.

Mechanically, the machine is extremely robust, and there is attention to detail. If the printhead gets too hot, for example, the print rate is suitably lowered to allow the temperature to drop to a safe level. Also, the cooling fan cuts out 20 seconds after the heat-generating mechanical components come to rest.

The Printstar operates in one of two basic modes: as a Qume lookalike NLO printer, or as an IBM dot matrix printer. The mode is determined by an internal DIP switch setting. The font is selected on power-up according to the setting of the first decade switch as follows:

Figure 1. Samples of the 5025's print quality using different fonts.

- a) Courier 10,
- b) Prestige 12
- c) Bold PS
- d) Draft mode
- e) Courier 10 italics
- f) Prestige 12 italics
- g) Bold PS italics.

The second thumbwheel specifies form length, or the top margin if a sheet feeder is in use. There are minor conflicts in the escape code sequences for the two modes, but these are well documented, and do not cause problems with Wordstar.

Because the 5025 looks like a Qume Sprint 5 to the PC, it is very



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## BIT BUCKET

easy to configure Wordstar for use with it. It handles all normally supported print attributes, such as bold, double-strike and under-score, and in addition to the fonts mentioned you can specify additional fonts if the 'download font memory' board is installed. The Fontmaster disk (for the IBM PC) contains a wide range of additional fonts and software to allow the user to specify original fonts. I was unable to test this feature as the unit was not equipped with the necessary option, but I understand a downloaded font remains in memory even when the printer is powered down.

In Qume-compatible mode, the print quality is superb (see sample printouts), and characters are printed at a rate of 90 cps (when at 12 cpi) or 75 cps (at 10 cpi). These speeds are doubled in draft print mode. In practical terms, we were able to print a full width (38 cm) page of labels (in Cheshire format) in 55 seconds using Courier 10, and the same page in just 34 seconds in draft mode. Vertical page slewing is a fast 20 cm per second, and it skips horizontally at 76 cm per second.

Like most dot matrix printers, the 5025 has a power-up test which gives a sample of the current typeface. This test is initiated by pressing the Linefeed button when switching on the power.

As a test of its IBM printer compatibility, a few simple operations revealed some minor adjustments were necessary to obtain full graphics compatibility. In particular, the Japanese painting shown in Figure 2 was printed from Microsoft's Mouse/Doodle program, but only after taking the following steps:

1. All DIP switches were off except for positions 5 and 7.
2. It was necessary to send <Esc> 3 <24> to the printer to adjust the line spacing. This was done from BASIC with the statement:  
`LPRINT CHR$(27);"3";CHR$(24)`

These steps also take care of the printing of graphics directly from the screen.

Resolution in graphics mode is 360 dots per inch horizontally, and 180 dots per inch vertically.

#### Documentation

The manual is the only thing worth criticising. Its contents are excellent and, in spite of being written in Japan, it's in first-class English — and comprehensive. However, it tends to fall apart as soon as it's opened, simply because of the comb binding which is a bit too small for the thickness of the volume. □



Figure 2. Painting by Hokusai of Mount Fuji.



# rie

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# COMMODORE 128

SOMETIME in July this year Commodore manufactured its five millionth C64. According to Commodore, around 250,000 of them have been shipped to Australia. Sales of this magnitude are impressive in anybody's language, but even Commodore's cost-cutting approach has not left it immune to the downturn in the home market. In the March quarter the company posted its first loss in years, a \$US20.8 million deficit; the full '84-'85 financial year results are also expected to show a net loss. While Commodore views this setback as temporary, there are now clear signs that the company is changing strategy, preparing an assault on the more profitable (and consistent) business market.

For all its success, the 64 has never been regarded as a business machine. It was never designed for this in the first place, but inherent weaknesses like its slow disk access and unexpandable memory have limited its ability to evolve in the way of the Apple II. It would have been easy enough for Commodore to come up with an all-new machine, but that would have required all-new software and, given the competitiveness of the market, third-party software support for Commodore will no longer be automatic (witness the Plus-4).

Commodore has obviously thought very carefully about this problem, and has come up with a very elegant solution — enter the C128. It has the words 'Personal Computer' prominent on its case, and while it is clearly targeted at the small business user, it also provides an easy upward migration path for existing 64 users.

## Stylish Design

On first sight, the C128 (priced at \$699) looks good — even pretty! Commodore obviously had a designer involved in the styling. The sloped keyboard has a very comfortable touch, with the quality feel normally only associated with much higher-priced machines. Apart from the standard qwerty keys, there are two sets of cursor keys, a numeric keypad, four function keys and eight other keys, including a 40/80 column key and a HELP key.

On the right side are two standard joystick ports, an on/off switch and a reset switch. The rear has sockets for just about

*Commodore has been around for quite a while, but it's never before produced a truly credible business machine. Has it managed to do so this time?*

every kind of video display, composite for standard monitors, RF for domestic TVs and RGB for those who want 80 columns in colour. There is a user port, a cartridge port, a serial port, and even a cassette port! The serial port allows the 128 to plug in directly to Commodore peripherals.

In terms of technology, the machine offers nothing particularly new. It uses two 6502-derivative processors alongside a Z80, and as its name suggests, it has 128 Kbytes of RAM. What makes it interesting is the use of gate arrays to configure itself into three different operating modes, each based on a different processor chip and memory map; in effect you have three computers in one. The modes are C128, CP/M and C64.

## C128 Mode

In native 128 mode, the 128 Kbytes (expandable to 512 Kbytes) RAM is banked into two chunks of 64 Kbytes with the program graphic space in one chunk and variables and data in the other. Machine code applications can make two programs co-reside — one in each bank. The machine can display 25 rows by either 40 or 80 columns. Commodore 64 users will find both Commodore character sets (upper/lower case or upper case/graphics) are available simultaneously in 80-column mode, and you can also generate your own character or graphics sets.

Even though the machine can display 80 columns, the pre-release model I saw could only draw high-res screens in the 320 by 200 pixels normally associated with 40-column displays. If you attempt to draw on the high-res screen, from 80-column mode

it will bank itself back to 40-column mode. This seems quite silly, since the demo programs show that under machine language the unit's hardware can draw high-res screens with a 640 by 200 resolution. Hopefully Commodore will fix this in the release versions.

Although the 128's processor can be run at either 1 or 2 MHz, graphics mode automatically drops it back to 1 MHz. I suspect this is because the faster mode takes some short cuts with screen updates. Even so, high-res drawing is respectably quick, even from BASIC.

The 128 uses a new Commodore BASIC (Ver. 7.0), and it has clearly been influenced by the criticism the 64's limited BASIC (V.2) received. BASIC 7 leaves room for few complaints. It has over 140 commands, including 16 specifically oriented to disk and file handling. The sound and graphics are well supported, almost to the point of luxury, with commands like ENVELOPE, FILTER, TEMPO, PLAY, and CIRCLE, BOX, GRAPHIC, GSHAPE and SPRITE. (Yes, it has eight sprites!) Commodore has also included other commands Microsoft BASIC has had for years — things like PRINT USING, WHILE, IF... THEN... ELSE, and so on.

Programmers will appreciate commands like RENUMBER, AUTO, TRAP, and TRON. All the function keys are programmable, but default to preset commands such as DLOAD or DIRECTORY. The HELP key will underline any program statement that caused an error. There's also a built-in monitor — fairly simple, but it's something that was notably absent on most of the previous Commodores.

## CP/M Mode

In this mode the 4 MHz Z80A processor is banked in. CP/M Version 3.0 (also known as CP/M Plus) is supplied on disk with the machine. As with 128 mode you can run with either 40 or 80 columns in 16 colours, although in 40-column mode you need to scroll sideways to see the other half of the screen.

The Z80 calls the processor for all I/O, using what is called a mailbox technique, where all I/O characters are placed in a buffer readable by all processors. In practice this is something users can forget

# COMMODORE 128



about, as the hardware takes care of it.

## 64 Mode

Commodore claims the machine is 100 per cent compatible with the 64, and everything I tried on it worked perfectly. Because of the gate switching and a complete copy of the 64's ROM, I see no reason to doubt the claim. However, once in 64 mode it forgets it has 128 Kbytes in the box; you have a C64 and no more, and can only return to 128 mode through a power-off/power-on sequence.

Commodore obviously regards the inclusion of 64 mode as a great marketing feature, and I'm inclined to agree. It not only appeals to existing 64 users who don't have to junk any of their software, but it should also appeal to business users who don't mind the occasional game.

One side benefit of this is in the cost of the games. Some (like Infocom's *Zork*) are 50 per cent cheaper, and quite apart from the huge pool of 64-unique software, almost all the entertainment (who calls a spade a spade?) programs available for the IBM and Apple are available in 64 versions.

## New Disk Drive

Accompanying the review machine was the new 1571 disk drive (\$549). In step with Commodore tradition, it is an intelligent peripheral (meaning it has its own processor and RAM and steals none of the host computer's memory); you can chain up to four of them off the 128 (or 64 for that

matter). It's a three-speed unit, automatically varying with the mode of the computer. In 64 mode it's the same as the 1541 at 320 characters per second; in 128 mode it's around six times quicker at 2000 cps; and in CP/M mode it increases to 3500 cps.

There is also a burst mode available in 128 mode. This can be called from BASIC with the *BLOAD* command, and will load a chunk of RAM at 4000 cps; 8 Kbyte high-res screens will thus load in just over two seconds.

The drive is read (but not write) compatible with 1541 format disks in much the same way as the 1541 can read but not write Commodore 2040 format disks. The 1571 formats disks on both sides, giving a maximum of around 348 Kbytes of storage. The drive formats both sides of a blank disk in under 45 seconds. Under CP/M the disk is capable of reading IBM System 34 format disks, and as this is a very common standard (also used by Kaypro and Osborne) there should be no difficulty obtaining correctly formatted software. Since the drive offers twice the storage at less than twice the price of a 1541, I would expect it will also find a market with 64 users, especially those who plan to upgrade ultimately.

## Documentation

The documentation accompanying the machine is excellent, easily the most comprehensive ever to emerge with a Commodore machine. It consists of a 34-page

introductory guide with plenty of photos and illustrations, and a far more detailed 440-page System Guide. This contains a full explanation of the 140 BASIC commands, including examples of their use, and short programs to demonstrate the graphics and sound commands. The BASIC commands are in two sections, those common to both the 64 and 128, and those that are 128 only.

One of the demo listings I keyed in did have an error in it (not my typing), but the 128's *HELP* command made it easy to find and fix.

Users new to CP/M will find an excellent introduction to this operating system. Also in the Guide is documentation for the built-in monitor. Commodore will be publishing a *Programmers' Reference Guide*, but it will be an optional extra.

## Conclusions

Apart from its rather large footprint there is little to criticise about this machine. Commodore has done its homework well. The C128 is obviously going to hurt the Apple II family, and will also affect some of the Z80 manufacturers. That said, I do think it represents the last of the 6502-based machines. The only way to improve on it would be to go to a 16 or 32-bit processor, which incidentally Commodore already has waiting in the wings. It's called the Amiga, and is said to be targeted at Apple's Macintosh market. If I were Apple I'd take the threat seriously. □



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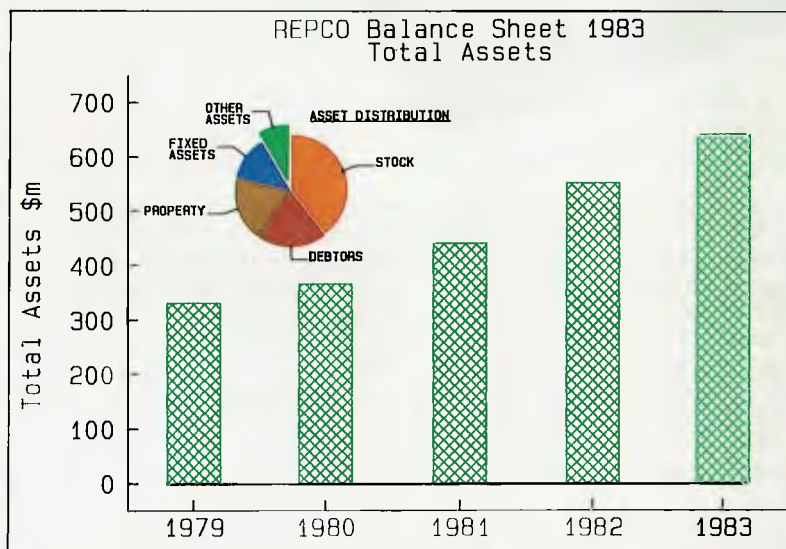
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(Charts shown here were produced with Houston and Hewlett-Packard plotters, on a Televideo 803.)

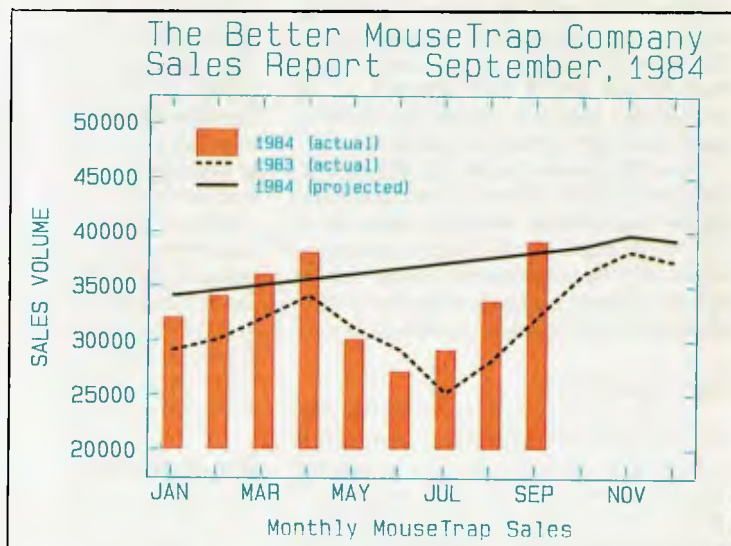
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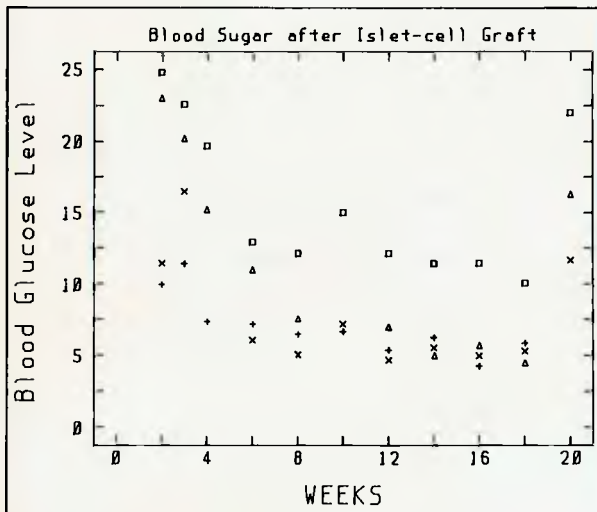
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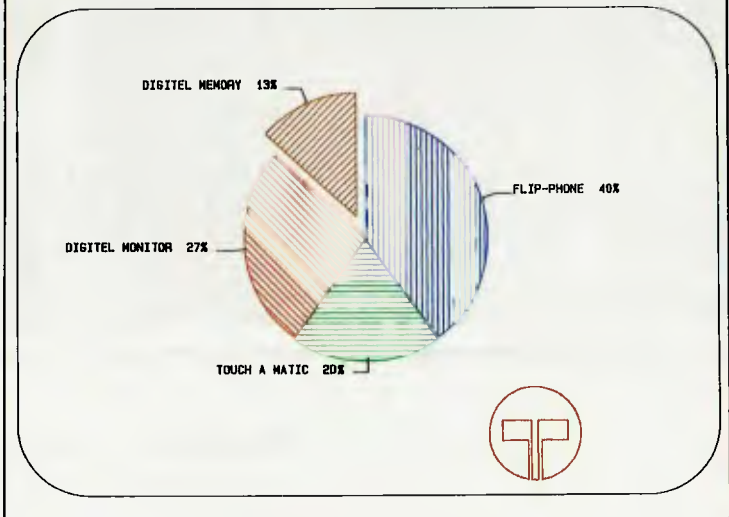
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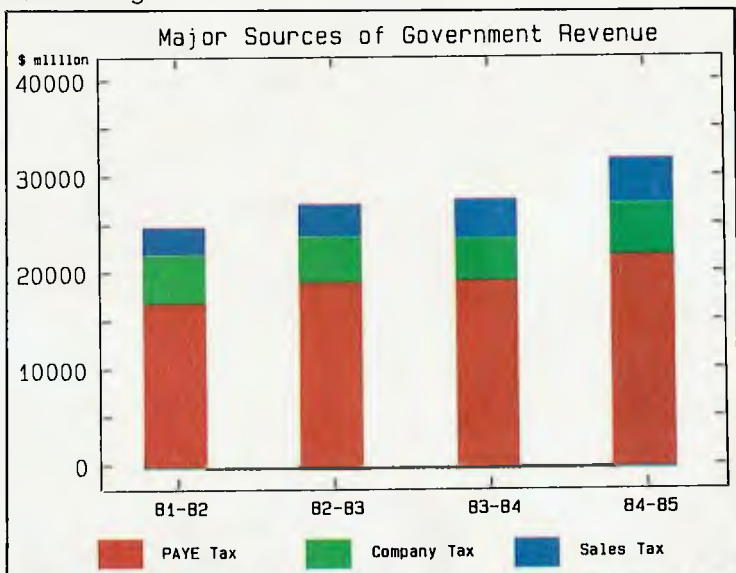
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# Instruction Set

## Structured Programming.....132

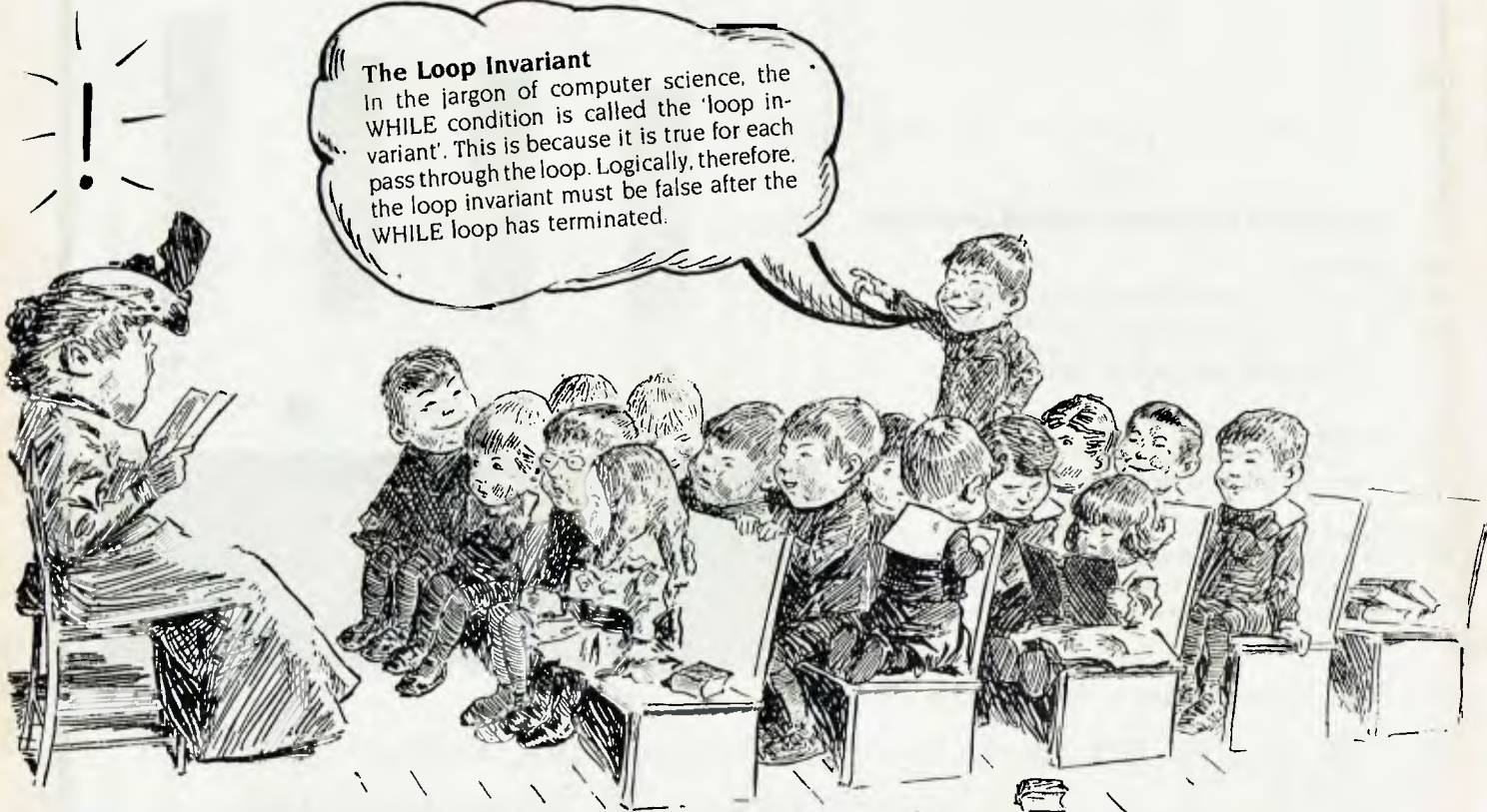
*It's a peculiarly prolific procedure; in this instalment, last month's Init and Process develop and get together to produce two new modules, the most prepossessing of which will be portrayed next month — but be warned, it too has progeny.*

## PCs in Marketing.....136

*In part two of this new tutorial series, Les discusses secondary research; how can marketers use computers to find and organise information on what other companies are doing in the marketplace, population trends, new processes and products, and so on?*

### The Loop Invariant

In the jargon of computer science, the WHILE condition is called the 'loop invariant'. This is because it is true for each pass through the loop. Logically, therefore, the loop invariant must be false after the WHILE loop has terminated.



# HOW TO WRITE A STRUCTURED PROGRAM — PART 6

*Phil Grouse, author of text books on computer programming (and a member of our Computer of the Year Award panel), continues his series on structured programming.*

---

IN OUR LAST ARTICLE, we described the initial stages in the development of a structured program to convert a keystroke file into a new format. That article contains the details of the program's logical requirements. Re-reading it before embarking on the next phase of our journey might help.

So far we've specified the program's mainline, and the short descriptions of each of the two referenced subroutines, Init and Process. This month's article will describe the development of both these modules, and will spawn two new modules in the process. The larger of these will be tackled in the next issue — but be warned, that module also has progeny.

We begin with Init. Its function is to "Open files, and initialise title table", according to its 'short definition'. Although it's sometimes a good idea to complete the initialisation module logic while developing the rest of the program, this example is sufficiently simple to let us do it in one hit.

cord counter to tally the records actually written to the new file. Some records in the original file are prefixed with a period; these are street or suburb specifiers, and do not generate records in their own right. Such records will not increment the tally.

## An Indecent Identifier

We will use the identifier 'M' to represent this tally. I know, I know — I should've used a decent identifier like 'Tally' or 'Records Written' — and I take the point. But short identifiers have various payoffs, such as execution speed, size of final program, and maximum width of the flowblocks. But I confess, the diagrams are already drawn, and my printer's broken.

'Init' will start 'M' at zero. It must also open the two files. The input file will be file #1, the output file will be file #2. Finally,

'Init' will initialise the current street name 'St\$', the current suburb name 'sub\$', and a nine-element 'title' table 'a\$'. The flow block is shown in Figure 1.

Notice the dividing line splitting the flowblock into a 'pile' of two blocks. This is sometimes done to improve readability, or to highlight the functionality of individual blocks. As we shall see later, demarcation of individual blocks is important when moving blocks between flowblocks.

Creating a dividing line with Speedit is simple. Just put the cursor on the line which is to be above the divider and press Control-L. A 'ruleoff' line will appear and the flowblock will be reformatted for the extra depth. You can delete individual lines of text, or even 'rule off' lines by positioning the cursor on the line to be deleted and pressing Control-Y. If you inadvertently delete the wrong line, you can restore it by immediately pressing Control-U (the 'undo' command).

Before proceeding to the Process module, a word of explanation about the title table is in order. Remember the table of prefix codes in our last article? An input line prefixed with '1' means 'Mr.', '2' means 'Mrs.' and so on. The table is organised so that the string element a\$(n) is the title for a prefix code n-1. In this way, a\$(1) corresponds to the code '0' which is required to generate a dummy 'title', which means 'do not post a letter from this record'.

## Not So Simple (Stupid)

Now for Process. Its short description was "Read, convert, and write one record". As it happens, that's a bit of an oversimplification, since not every input record generates an output record.

You can reach the 'ending' flowblock of a program with Speedit's Alt E command. That should display the empty Process module with its short description at the

bottom of the screen. Figure 2 shows the first stage in the development of that flowblock.

The first thing this module must do is read a record from file #1. We will use the LINE INPUT statement so that BASIC will read the entire record (in case the record includes punctuation marks). The record is read into the string variable 'Rec\$'. If the record is legitimate, its first character (or 'indicator') must be a ' ' or a digit in the range zero to eight. Anything else is invalid.

Having collected the record in 'Rec\$', we next isolate the indicator in 'f\$'. The third statement sets a numeric variable 'i' corresponding to that indicator. BASIC's INSTR function tries to find the position of the second string within the first. Thus, if 'f\$' is the string '2', then 'i' will be the number four. If the indicator is not found within the first string, 'i' will be zero. The following table shows the relationship:

Indicator	i
	1
0	2
1	3
2	4

and so on.

If 'f\$' is invalid, 'i' will be zero. We can now use 'i' to select the correct action, and (if appropriate) to select a suitable title from the array 'a\$'.

## Exploring the Alternatives

There are now a number of possible design alternatives. Since there are only 11 allowable values for 'i', we could use a CASE block. In this instance, however, that's not such a good idea, because we're really interested in only three logical possibilities for 'f\$' — not 11. These possibilities are (1) ▶



## Init

```
M=0 :rem record counter
input "Name of input file",a$
input "Name of output file",b$
open a$ for input as #1
open b$ for output as #2

st$ = "No Street"
sub$ = "No Suburb"
a$(1) = "NO POST"
a$(2) = "MR"
a$(3) = "MRS"
a$(4) = "M/S"
a$(5) = "MR & MRS"
a$(6) = "DR"
a$(7) = "REV"
a$(8) = "MR & M/S"
a$(9) = "DR & MRS"
```

Figure 1. The initialisation module 'Init'.

a period '.', (2) one of the digits zero to eight, and (3) something else. These alternatives correspond to values of 'i' of 1, 2 and so on. We can use 'i' to index 'a\$' in the second case. Three cases is below the worthwhile threshold for a CASE block, so we'll use a pair of nested IF-THEN-ELSE blocks. Figure 3 shows the structure of this next addition to the module. It invokes a new module called 'Dotty' to deal with a record starting with a period, and another new module 'RealRecord' to handle records with an indicator '0' to '8'. If 'f\$' is invalid, the alarm bell is sounded and an error message is displayed.

When using Speedit, the first IF block is created with the F5 key. It displays two empty controlled blocks prefixed by the keyword IF. You then type the IF condition (in this case 'i > 0'). The End key is then pressed to position the cursor in the 'true' or 'then' block. Since this block is also an IF-THEN-ELSE, you press the F5 again to generate the nested structure shown in Figure 3. The F8 key lets you generate the calls to 'Dotty' and 'RealRecord'.

Let's now consider the module 'Dotty'. Its function is to deal with records which begin with a period ('.'). If the second character isn't a period, we assume that this is a street name specification such as

.HELENA CRESCENT

If the second character 'is' a period, then

## Process

```
line input #1,rec$ :Rem read a complete line into rec$
f$=left$(rec$,1) :Rem f$ is first character of the record
i=instr(".012345678",f$)
```

Figure 2. The first steps of Process read a record and set the variable 'i' according to the first (indicator) character 'f\$'.

## Process

```
line input #1,rec$ :Rem read a complete line into rec$
f$=left$(rec$,1) :Rem f$ is first character of the record
i=instr(".012345678",f$)
```

```
IF i>0
```

```
IF i=1
```

```
GOSUB Dotty IGOSUB RealRecord
```

```
beep
```

```
print "ERROR IN: "
```

```
print tab(10); rec$
```

Figure 3. Logical extension of the 'Process' module to provide for switching on the value of the indicator character 'f\$'.

the record is a suburb specification, for example

.LANE COVE NSW 2066

In either case, the corresponding street or suburb 'memory' is set by the specifier. Figure 4 shows the complete 'Dotty' flow-block

## The 'RealRecord' Module

We are now left with the 'RealRecord' module. Here's where all the work is done. It must create a new record with the specified format from the record in 'rec\$' and write it to file #2.

## RealRecord

```
IF f$ = "0"
```

```
nm$=""
```

```
number$=mid$(rec$,2)
```

```
j=len(rec$)
```

```
IF right$(rec$,1)>"9"
```

```
j=j-1 :rem bypass the letter after number
```

```
WHILE mid$(rec$,j,1)<="9"
```

```
j=j-1
```

```
nm$=mid$(rec$,2,j-1)
```

```
number$=mid$(rec$,j+1)
```

```
GOSUB PutFile
```

Figure 5. The logic of the 'RealRecord' module.

## Dotty

```
IF mid$(rec$,2,1) <> "."
```

```
st$ = mid$(rec$,2) sub$ = mid$(rec$,3)
```

Figure 4. The 'Dotty' module deals with records which start with a period. Here, the logic tests the second character of the record to see if it is also a period. If it isn't the street 'memory' 'st\$' is set with the remainder of the record. Otherwise the suburb 'memory' is set. Note that in IBM BASIC the mid\$ function with only two arguments returns all characters from the specified starting position to the end of the source string.

We can now restrict our thoughts to records which start with one of the digits zero to 8 (corresponding to values of 'i' from two to 10). The case of an indicator character 0 deserves special treatment since there is no corresponding name in 'rec\$', only a street number. For example, if 'rec\$' is the string '04/123', this means the name field in the output record must be blank, but the street number will be 4/123. All the other cases require isolation of the name.

Let's ask 'RealRecord' to begin by setting the name into the string variable 'nm\$', and the street number into 'number\$'. We can then concentrate on the problem of writing the new record in the correct format. Why didn't I use 'name\$'? I tried. IBM advanced BASIC threw up at this because it's a reserved word, hence 'nm\$'.

Now take a look at the 'RealRecord' flowblock shown in Figure 5. It relegates the problem of writing the actual record to another module 'PutFile' after computing 'nm\$' and 'number\$'.

Note how the first action is to test whether or not the indicator character 'i\$' is '0'. If it is, 'nm\$' is set equal to the 'null' string, and 'number\$' is set to correspond to everything in 'rec\$' which follows the leading '0'.

It's not quite as simple when the indicator is one of the digits '1' to '8'. In this case we must first locate the position in 'rec\$', marking the last character of the name so the name and number can be separated. This position will be set in the numeric variable 'j'.

For the purposes of this exercise, a legitimate 'house number' may contain any of the decimal digits and a possible '/' (which separates flat numbers from street numbers). There may also be a single appended letter, such as 43A. Thus, legal house numbers might be 54, 12, 3/22, 12B, and so on.

Now watch how the ELSE branch computes 'j'.

We begin by marking the last character in 'rec\$' with the statement

```
j = len(rec$)
```

This simply sets 'j' equal to the length of 'rec\$', and therefore the position of the last character.

We next make an adjustment if this last

character is a letter (as in 43A). The expression

```
right$(rec$,1)
```

corresponds to the furthest character to the right of 'rec\$'. If it is greater than the character '9', it is assumed to be a letter, and j is suitably decremented.

By the way, this is a questionable short cut to determine if a character is a letter of the alphabet. We are assuming that the ASCII collating sequence applies. On some other computers, this is just not true. A more 'kosher' test would be performed by the following pair of statements:

```
last$ = right$(rec$,1)
if last$ >= "A" and last$ <= "Z"
```

Even so, this test will miss cases where the letter is in lower case.

Nevertheless, let's accept the ASCII assumption and now adjust 'j' until it marks the last character of the name field. The way we have done this is to test the character at position 'j' to see if it is part of the number, and to decrease it by one if this is true. We keep doing this WHILE it is true. Consequently, when it isn't true, 'j' is no longer in the number field and is marking the last position of the name. This is why we are using a WHILE block.

## The Loop Invariant

In the jargon of computer science, the WHILE condition is called the 'loop invariant'. This is because it is true for each pass through the loop. Logically, therefore, the loop invariant must be false after the WHILE loop has terminated.

Again we have assumed the ASCII collating sequence which ranks the decimal digits and the '/' character all less than or equal to '9'. Remember that the BASIC expression

```
mid$(rec$,j,1)
```

is simply the single character at position 'j' in 'rec\$'.

Having computed the value of 'j', it's a simple matter to assign both 'nm\$' and 'number\$' as shown in Figure 5.

In our next frenzy of logical insights, we'll complete this exercise, starting with the module 'PutFile'. See if you can solve it before reading our solution in the next issue. □

# FMS

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C Interpreter. Perfect for learning or teaching C and debugging C code. Operates like Basic. 100 common functions built in.

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# PERSONAL COMPUTERS IN MARKETING — Part 2

*This month Les discusses secondary research, and explains how computers can help you take advantage of some of the most comprehensive sources of information in the world — without leaving your office.*

---

HAVING DISPOSED of primary research in the July issue, we can now turn our attention to secondary research. Primary research, you'll recall, consists of finding out what consumers think about products or new product ideas (that's a vast oversimplification, but this is a computer magazine, after all).

While consumer attitudes are important, they are not all that is important. The marketer also needs to know about things like what other companies are doing in the market, new processes and products, what the total market size is, population trends and so on.

This information comes under the heading of secondary research, and it's something that all marketing executives do to varying degrees. Philip Kotler, in his book *Marketing Management — Analysis, Planning and Control*, says there are four modes of scanning the environment for marketing intelligence:

1. **Undirected Viewing:** general exposure to information where the viewer has no specific purpose in mind.
2. **Conditioned Viewing:** directed exposure, not involving active search, to a more or less clearly identified area or type of information.
3. **Informal Search:** a relatively limited and unstructured effort to obtain specific information for a specific purpose.
4. **Formal Search:** a deliberate effort — usually following a pre-established plan, procedure or methodology — to secure specific information relating to a specific issue.

Personal computers are of limited use in cases 1 and 2. We gain most of our information from business journals, newspapers, textbooks, personal contact, courses,

BI/INFORM	Abstracts on general decision sciences information from approximately 550 primary publications.
ADTRACK	Indexes all advertisements of 1/4 page size or larger appearing in 148 major United States consumer magazines, accounting for over 98 per cent of advertising revenues in major magazine categories. Intended for ad agencies, product and brand managers, retailers and magazine publishers. (Probably of United States interest only.)
ARTHUR D. LITTLE/ ONLINE	Contains references to forecasts, planning, report assessments and development reports in the following subject areas and industries: strategic planning, economic forecasts, opinion research, company assessments, energy management, chemicals and related products, consumer products and services, electronics, health care, telecommunications and more.
FIND/SVP REPORTS INDEX AND STUDIES	Indexes and describes all industry and market research reports, studies and surveys from over 300 United States and international publishers. The purchase price of reports is included and reports can be ordered via Dialog from FIND/SVP.
HARVARD BUSINESS REVIEW	This database contains the complete text of the <i>Harvard Business Review</i> from 1976 on, as well as citations and abstracts to HBR articles from 1971 to 1975, plus 700 other classic earlier articles.
INDUSTRY DATA SOURCES	Contains information on bibliographic sources of financial and marketing data for 65 major industries. Provides both primary and secondary sources of industry data including: marketing research reports, investment banking studies, special issues of trade journals, economic forecasts and numeric databases.

Table 1. Useful Dialog databases

seminars and the like — none of which relates to personal computers.

However, there are some areas in which PCs can help with external information-gathering. The most important of these is in accessing external databases. These are large volumes of data, usually in text form, stored on computers which you can dial into and query.

Now it must be admitted that a personal computer is not required to do this; a dumb terminal will work almost as well. However, once you have a PC on your desk, it makes sense to have this facility available, since it involves only, say, \$200 up

front for the purchase of a modem and database access is on a 'pay as you use' basis.

What's involved in setting up to access databases? We've covered this topic before in *Your Computer* (see the October 1984 edition), so I won't dwell on it here, but briefly you'll need a PC with a serial port, a modem which links the serial port to the phone line, and some software which links the keyboard and screen to the serial port.

Suitable modems are easy to find. They start at just over \$150 for a simple 300 baud (30 characters transmitted per second) modem and can go up to well over

\$1000 for a 1200 baud modem. Many IBM PC owners are finding the NetComm In/Modem, which plugs inside the PC, the easiest to use.

Obtaining suitable software is a bit more tricky. The package required is technically known as a terminal emulator program, though it is often called a modem program, after one of the first such programs. Several commercial programs are available, such as Crosstalk, MITE and others. You may already have an integrated software package such as Symphony, Framework or Open Access, which has a terminal emulator program built in.

Alternatively, you can obtain communications programs from public domain software libraries, through user groups. Examples include the Modem family of programs, of which Modem7, Modem840 and Modem901 are the best known. For the IBM PC, PC-Talk III appears to be the standard package, while in the eight-bit world YAM (Yet Another Modem) has proved popular. All these programs compare very favourably with the commercial products — except in the area of documentation (there often isn't any, at least not on paper).

Features you should look for in any communications program include the ability to save incoming text into a file for later editing and printout, or at least the ability to print incoming text as it arrives. File transfer using the Christensen protocol is also important.

Assuming that you have all the equipment and software, what else will you need? To access overseas databases, you'll need an account for MIDAS, OTC's Multi-mode International Data Acquisition Service. This allows you to make a local phone call to OTC's computers, which will then connect you to the data network of the target country.

You will also require an account identification and password for the database system you want to use.

There are many databases available if you know where to find them. Perhaps the best known are the United States databases accessible through MIDAS, such as Dialog, Orbit and others. I contacted the local agents for Dialog Information Services, Insearch Ltd (the technology transfer division of NSWIT) and organised a demo.

The first thing to remember about Dialog is that it is huge. It's not only physically huge — I've never seen a computer room ▶

## PREDICASTS, INC

Predicasts has several databases of use to marketers, for both United States and international data:

**PTS INTERNATIONAL FORECASTS** Contains abstracts of published forecasts with historical data for all countries of the world (excluding the United States). Coverage includes general economics, all industries, detailed products and end-use data. Abstracted from over 1,000 sources.

**PTS INTERNATIONAL TIME SERIES** Contains about 2,500 forecast time series consisting of about 50 key series for each of the 50 major countries of the world (excluding the United States). Coverage includes employment, GNP, per capita income, production or usage of major materials, and so on.

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**TRADE & INDUSTRY INDEX** Indexes and selectively abstracts business journals relating to trade, industry and commerce, such as *Wall Street Journal*, the *New York Times*' financial section, *American Banker*, *Advertising Age*, *Coal Age*, *Byte*, *Electronic Design*, and so on. Also has the complete text of PR Newswire.





tional and, in particular, Australian information. Of course, these databases will be of most use to international marketers.

We do also have some local databases. For example, the Australian Bureau of Statistics maintains a number of databases, mainly of census and similar demographic databases, to which one can gain on-line access.

Apasco, a specialised company dealing in marketing information, has a database of consumer consumption trends, from which it is possible to find out things like the overseas travel intentions of households in postcode area 2089, for example.

Infobase, an affiliate of CSA (Computer

Sciences of Australia) also has a demographics database, called Infobank, on its network. This includes details such as the Census of Housing and Population, motor vehicle registrations data, AMIS (the Australian Municipal Information System) and others. Infobase is also able to provide information on IBM PC disks, if required.

Databases such as those mentioned here are unlikely to satisfy all your secondary research needs. But they will speed searches considerably and turn up many references that would otherwise not have come to light. Used correctly, they can be a significant tool for the marketer, and they're getting better all the time.

## References

- Kotler, Philip, *Marketing Management — Analysis, Planning and Control*, 4th edition, Prentice-Hall, New Jersey, 1980.

## Contacts

- APASCO, 56 Berry Street, North Sydney 2060. Phone (02) 922 2088.
- Infobase, Computer Sciences of Australia (CSA), 460 Pacific Highway, St Leonards 2065. Phone (02) 439 0033.
- Information Services, Australian Bureau of Statistics, PO Box 10, Belconnen 2616. Phone (062) 52 6627.
- Insearch Ltd/Dialog, PO Box K16, Haymarket 2000. Phone (02) 212 2867. □

```

$1.00 4 Types in format 5
$1.00 4 Types
$0.99 Telenet
$9.71 Estimated cost this file
$10.24 Estimated total session cost 0.114 Hrs.

File 189: INDUSTRY DATA SOURCES 79-85/Jun
(Copr. IAC 1985)

Set Items Description
-----
?a wool? and wool? <-- Search for wool, woollen, etc
      638 WOOL?
      1385 AUSTRAL?
      48 WOOL? AND AUSTRAL?
?a wool? <-- Limit to title and description
      S1
      48 WOOL? AND AUSTRAL?
?d225
      S2 4D S1/TI.DE
      Display 2/5/1

100607 CN=85-005163
Australian Wool Situation.
Silcock, J.S.
Wool and Woollens of India
July 1984 v.21; no 3 pg.19-22
PUBLISHER: Indian Woollen Mills Federation Churchgate Chambers, 5 New
Marine Lines Bombay 400 020
India
DOCUMENT TYPE: Journal Article; Conference Proceedings (jnal, conf)
RECORD STATUS: Primary Source
LANGUAGE: English
GEOGRAPHIC COVERAGE: Australia (aus)

Analyzes Australian wool situation as presented to the World Wool
Forum at the IWTO Conference in Tokyo. Tables show Australian sheep numbers
and wool production, 1980-1985; composition and quality of Australian
woolen clip stock of greasy wool, 1980-1984; and Australian wool stocks,
1984. Examines wool industry market performance and production.

DATA DESCRIPTORS: Production, 1980-1985; Forecasts, 1984-1985; Stocks
(Inventories), 1984; Performance

SIC CODES: 2231, Weaving and finishing mills; wool; 0214, Sheep and goats;
2299, Textile goods, nec; 2241, Narrow fabric mills; 2283, Wool yarn mills
--more--
?d
INDUSTRY DESCRIPTORS: Textiles; Agriculture
-- end of display --
Display 2/5/2

095803 CN=84-027917
National Wool Grower: State of the Industry.
National Wool Grower
October 1984 v.74; no.10 pg.20-21
PUBLISHER: National Wool Growers Association 8 E. Broadway, Suite 415 Salt
Lake City UT 84111
United States of America
TELEPHONE: (801)363-4483
DOCUMENT TYPE: Statistics; Journal Article (stat, jnal)
RECORD STATUS: Primary Source
LANGUAGE: English
GEOGRAPHIC COVERAGE: United States of America (usa)

Examines the U.S. sheep industry. Analyzes monthly data on
lamb-to-beef wholesale price spread; Australia-to-U.S. wool price spread;

```

```

wholesale lamb prices; and F.I. slaughter, January 1983-April 1984.

DATA DESCRIPTORS: Industry Analysis, 1983-1984; Agricultural Production;
1983-1984; Wholesale Prices, 1983-1984

SIC CODES: 0214, Sheep and goats
INDUSTRY DESCRIPTORS: Agriculture
-- end of display --
?d
Display 2/5/3

088208 CN=84-019173
Special Reports: Farmers Lead Australia's Economic Recovery.
Agriculture Abroad
December 1983 v.38; no.4 pg.44-47
PUBLISHER: Canada, Agriculture Canada, Communications Branch Sir John
Carling Bldg. Ottawa Ont. K1A 0C7
Canada
TELEPHONE: (613)995-8963
DOCUMENT TYPE: Journal Article (jnal)
RECORD STATUS: Primary Source
LANGUAGE: English
GEOGRAPHIC COVERAGE: Australia (aus)

Reports on the role of the farm sector in the farm sector in the
Australian economy, 1983; with forecasts for 1984. Provides figures on the
situation in grains, oilseeds, meat, wool, dairy, sugar and cotton;
horticulture; the rural economy in general; government spending; and
employment.

DATA DESCRIPTORS: Agricultural Production, 1983-1984; Forecasts, 1983-1984;
Commodities, 1983-1984; Farm Marketings, 1983-1984; Government Spending,
1983-1984; Employment and Unemployment, 1983-1984; Acreage, 1983-1984;
Commodity Prices, 1983-1984

SIC CODES: 0100, Agricultural production-crops; 0200, Agricultural
production-livestock
INDUSTRY DESCRIPTORS: Agriculture
-- end of display --
?b411
-- Begin on database 411
-- Dialindex, index to
-- other databases

17Jun85 19:38:18 User:003502
$5.10 0.068 Hrs File189
$0.68 Telenet
$5.78 Estimated cost this file
$16.01 Estimated total session cost 0.182 Hrs.

File 411:DIALINDEX(tm)
(Copr. DIALOG Inf.Ser.Inc.)
?a mkindex <-- Which files have references to market research?

File 16: PROMT - 72-85/Jun (UD=8506W1)
File 18: F & S Indexes - 79-85/Jul (UD=8507W1)
File 19: CHEM. INDUSTRY NOTES 1974-85ISS22
File 43: ADTRACK 80-84/SEP
File 148: TRADE AND INDUSTRY INDEX - 81-85/May
File 189: INDUSTRY DATA SOURCES 79-85/Jun
File 192: ARTHUR O LITTLE/ONLINE 77-85/Jun
File 196: FIND/SVP REPORTS AND STUDIES INDEX - 77-85/JUN
File 268: FINIS:Financial Industry Information Service
File 545: INVESTEXT - Jun & 1985

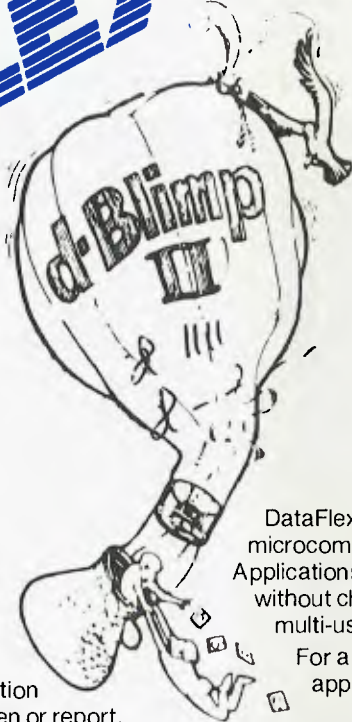
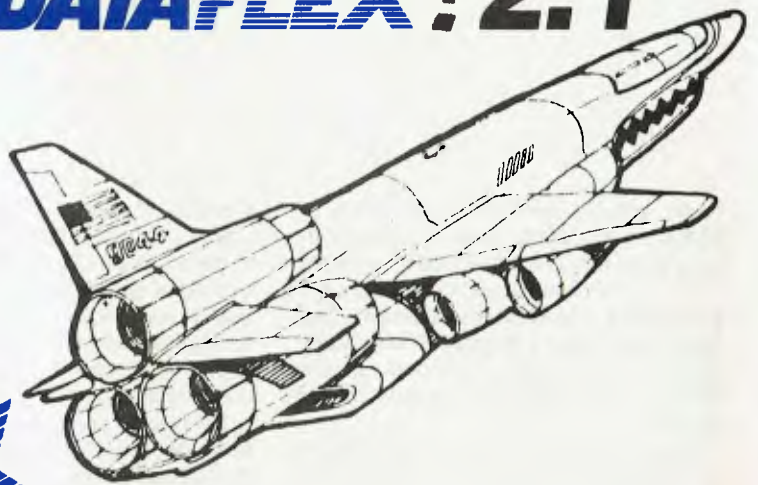
File Items Description
-----
?a wool? and wool?

```



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THE ANNOUNCEMENT OF the IBM PC AT and new video boards coincided with the arrival of Topview, IBM's extension to DOS. I spent a weekend using version 1.0 of Topview, and was left with mixed feelings. Topview's main claim to fame is that it allows concurrent processing, so a BASIC program, a dBase II application and other applications can run in separate windows simultaneously.

It was magic to find such applications, with a disk file in the background, and the capability of using dBase interactively in the foreground. In conjunction with all this I used a supplied alarm clock program, but was disillusioned when I started running a communications program and various lock-ups occurred, forcing a reboot.

Another program supplied with Topview was a calculator program, which I could never get to do anything, and couldn't quit without rebooting.

IBM doesn't claim that all PC-DOS compatible software will run with Topview. A listing of IBM software which vendors claim should run is provided, but the third-party software hasn't been tested.

## User Interface

Topview's interface was less than satisfactory. It is designed around a mouse, the user calls up a menu, uses the mouse to move the cursor over the desired option, and then presses a button on the mouse to select the option. Users without a mouse use the cursor pad.

Lotus 1-2-3 uses a similar menu system where the cursor is placed over a selection, and <enter> is pressed to select it. But it also allows an alternative which dramatically speeds up operation; that is, you can just press the key carrying the first letter of the chosen option. The tested version of Topview didn't allow such a simple, speedy method of operation.

## Hardware Limitations

Topview's greatest setback is that it's very hardware specific. I've got a real IBM with an external hard disk which uses its own operating system beneath DOS and assigns logical drives to the conventional drive identification letters. According to its packaging, Topview runs on the AT, the portable PC, the XT and the normal PC.

I expected Topview to run with my hard disk, but it couldn't find the drives — neither on the hard disk nor on either floppy when the hard disk was booted — so I had to reconfigure as a simple twin-drive

system. In the depths of the manual IBM does specify that Topview can only find physically valid drives. It apparently goes straight to the hardware and bypasses DOS when accessing the disks.

When Lotus bypassed DOS to write to screen the software was called 'badly behaved'. Now IBM's guilty of producing software which does much the same!

## Memory Limits

Topview is enormous. With DOS it takes around 200 Kbytes. Symphony would be struggling to run a decent-sized spreadsheet in what's left. Topview is supposed to allow other programs to run, or be resident in memory, at the same time.

## Batch Files

Most serious users set up batch files to simplify often-repeated tasks, and lots of novices have batch files set up for them for similar tasks. Topview doesn't support batch files — probably its most serious omission from the user's point of view.

## Passing Parameters

DOS allows a BASIC program to be run from DOS command level with a command line like

A> BASICA DEMO

which results in BASICA being loaded, and DEMO.BAS being loaded and run. I couldn't set up such arrangements on the Run Program menu within Topview.

## The Bottom Lines

Is it all bad? Will Topview die like the PC-Jr? I very much doubt it. DOS 1.0 was pretty weak, but it has evolved into the powerful, relatively reliable DOS 3.xx. Vendors have announced other software which allows multi-tasking, and some which partitions RAM, allows different programs to be loaded into each partition, and lets the user switch between them.

I recommend that users wait for Topview 2.0. It looks like IBM has marked out the playing field for future multi-tasking operating systems for the PC, and especially the AT, effectively stalling developments by other companies. Now IBM can refine, debug and add features to Topview, while the other software developers take advantage of this potential industry standard, bypassing some of the work needed to make applications programs work satisfactorily on many operating systems.

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I'D LIKE to start off this issue by thanking the Microbee Users' Group of Western Australia for being so quick off the mark in sending an official copy of its newsletter to me as a Microbee columnist. Fame at last! Seriously, this group puts out a really good 'newsy' newsletter, and has had some very good articles in recent issues. Its pieces on Microbee strings are some of the best I have seen on this subject.

The WA group meets on the first Sunday of each month in the Nurses' Lecture Theatre at the Charles Gardiner Hospital, from 7 to 10 pm. If you can't go along to a meeting but still want to join this worthwhile group, write to Mike Oborn at 4 Garnkirk Rd. Greenwood 6024.

### Troubles with Colour System

I've also had the opportunity to look at some very interesting programs from various sources, but I struck some trouble with several of the programs not running initially on my colour system.

The Microbee uses a character block eight dots wide and 16 dots high, resulting in some rather elongated characters; in fact it takes three characters side-by-side to make a square graphics block when using PCG characters. Machine language programs have taken advantage of the reprogrammability of the 6545 CRT-controller IC to reformat the screen, so that each character is formed by a block eight lines high.

A little thought will soon show it now takes twice as many characters to fill up the entire screen. This isn't really a problem, since the Microbee has a 2 Kbyte

screen memory chip which is only half utilised by BASIC. The problem with these programs occurs on a colour machine, as BASIC only initialises the first 1024 bytes of the 2 Kbyte colour RAM. If the second 1 Kbyte of RAM is not initialised in some way, the bytes will probably be set to zero, corresponding to a colour of black on a black background. This explains why so many machine language programs only show up on the top half of the screen.

Fortunately the solution is simple, and has some side benefits. Run a BASIC loop to POKE all colour locations with a known value, such as 2, corresponding to a green screen. To do this in the immediate mode you would type:

```
OUT 8,64:FOR X = 1 TO 2048:POKE
63488+X,2:NEXT X:OUT 8,0.
```

### Programs

Now for the programs. Andrew Brent, the Sydney agent for Dreamdisk, Dreamcards and Mytek (among others), kindly lent me three of the last Mytek cassettes to be released before the company ceased operating. The programs were King Tut, Space Invasion and Galaxians. The last two titles are on the same cassette and at \$19.95 for the two programs are good value.

However, it was King Tut which took my fancy. It's one of those games (like Emu Joust, my favourite) which is sufficiently different to hold one's interest. Tut is a maze-type game in which you have a limited time to manoeuvre a little man, collecting treasure and keys. The latter are needed to unlock various doors before proceeding to higher levels. Of course

there are complications caused by various skulls, spiders, snakes and scorpions, which materialise in a puff of smoke. All are deadly if contacted, but your hero has a gun and a flashbomb to eliminate the beasties. After 100,000 points you get an extra man, but it took me quite a while to find this out! Three different mazes and keys provide variety, and the neat sound effects can be toggled on and off at any time. The first time the game is played, you only get two men, but on subsequent rounds you get three, along with the occasional spider and so on, which materialises right where you're standing! At the price of \$22.50, it's a good game to while away a cold winter's evening or two.

Andrew Brent can be contacted at PO Box 268, Mortdale 2223, and he has items for sale at SMUG meetings on the third Saturday of each month at Strathfield Girls' High School from 1 to 5 pm.

Another program I've recently seen for the first time is Pogog Manor, an adventure game from Applied Technology.

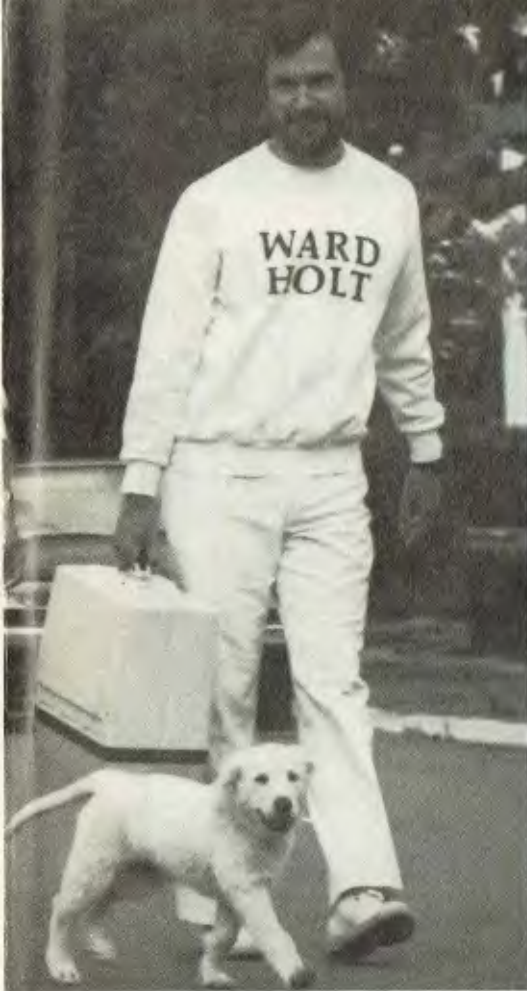
This starts with the promising introduction of a witch, with a bat fluttering around the screen in a neat manner. However, the introduction is written at a very slow speed to the CRT, with all spaces eliminated after every fullstop, and there seems to be no way of avoiding the whole laborious process when the program is run a second time. Within the adventure itself there are no clues given as to what directions are legitimate, resulting in screens full of messages saying 'No passage that way'.

I gave up after three such screens. □

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# BOOKS IN BRIEF

## Business Graphics for the IBM PC

Nelson Ford

Sybex (ANZ), \$41.95

This book opens the door to a world of practical business graphics applications. Ford begins with an overview of graphics theory, then moves into clear explanations of how to write graphics routines for all types of graphs, how to instantly change from one type of graph to another with the same set of data, how to change the size of a graph and specify its location on the screen, and how to create pictorial graphs and draw your own corporate logo.

## The Encyclopaedia of Microcomputer Terminology

Linda Gail Christie and John Christie

George Allen & Unwin, \$12.95

A collection of more than 4000 microcomputer terms for both hobbyist and professional microcomputer users, explained in language a layperson can under-

stand. Technical jargon is defined and appendices provide quick access to charts, tables and specialised information. The BASIC keyword glossary explains more than 200 BASIC terms and operators and gives examples of how they are used.

## Creative Computer Graphics

Annabel Jankel, Rocky Morton

Cambridge University Press,

\$29.50

A superbly illustrated hardback worthy of a place on even the most prestigious of coffee tables, this book is divided into an introduction and nine sections: history, modelling techniques, views, design and industry, science and simulation, art, feature films, television and video games and home computing. It explores the ability of computer graphics to enhance the creativity of people who work in industry, engineering, art and science. And it depicts the creations of people whose work is computer graphics:

the machines they've built, the techniques they've developed, and the pictures they've produced. A collective of art directors has tried to snaffle it from our shelves ... a scuffle ensues ... if we get it back we'll review it in full.

## Machine Codes for the Atmos and Oric-I

Bruce Smith

Shiva (ANZ), \$6.95

A full description of all the machine code instructions available for the Oric's 6502 chip, and suggested applications for their use. This book explains how, when and where machine code routines can be entered, and a simple monitor program is provided to help you enter them.

## How To Use Scripsit

Cleborne Maddux, Jackie Pederson,

Jerry Willis

Dilithium Press (ANZ), \$9.95

This book is divided into two parts: a tutoring section which assumes no experience with mic-

rocomputers or the Scripsit program, and a quick-reference section which provides an index of topics and commands with brief discussions of each. Four appendices are also included, for those interested in other disk operating systems, in converting Scripsit to Superscripsit, in cassette rather than disk operation, or in using Scripsit with the TRS-80 Model I computer.

## Data Processing for Business Studies

AE Innes

Macdonald & Evans (ANZ),

\$14.95

An introduction for those approaching a study of data processing for the first time. The exercises in the book are designed to stimulate further thought on the chapters' subject matter, to consolidate learning by reviewing material already presented in a new light, and to secure ideas by anchoring them to real-life experience. □

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THE 1541 DISK drive is often criticised for its slow speed, but it does have some merits. It's much faster and far more convenient than a cassette, and deserves credit for the fact that the actual disks seem very resistant to corruption by mistreatment. Cigarette smoke and dust are generally regarded as very dangerous to floppy disks, but the 1541 seems to have an unusually high tolerance. Perhaps it has something to do with its slow speed...

In any case it's obvious that not every 1541 owner is getting the most out of the unit. Let's look at some of its characteristics.

## Commodore DOS

The 1541 is an intelligent peripheral, 'intelligent' in this sense meaning it has its own built-in processor and DOS (disk operating system). This is a plus because it means the unit steals none of your C64's RAM or ROM space and is ready to go as soon as you turn it on.

The DOS inside the 1541 takes care of all the housekeeping when reading and writ-

ing to the disk, including the motion control of the read/write head. Among other things it also works out which blocks it's going to save your program on, updates the directory and does error checking.

All that remains is for you to give the orders. Some commands like LOAD and SAVE are simple to use from BASIC, but others, like reading the error channel, require you to issue a sequence of commands. For example, if the 1541's red light starts flashing, it means the DOS has found an error, but it doesn't tell you what it is. To find out you can read the error channel with the following BASIC lines:

```
10 OPEN 15,8,15
20 INPUT #15,EN$,ED$,ET$,ES$
30 PRINT EN$,ED$,ET$,ES$
40 CLOSE 15,8,15
```

EN\$ is the error number, ED\$ is a brief description of the error, and ET\$ and ES\$ refer to the track and sector where it occurred.

All this can become quite tedious, especially since the INPUT command can only be issued from within a RUNNING program

and not from DIRECT mode.

## The Easy Way Out

There's a much easier way. Supplied with every 1541 is a test/demo diskette containing several disk utility programs, one of them designed to make the issuing of disk commands extremely simple. This C64 program is actually in two parts, of which the first is a boot program called C64 Wedge, which will load and run the second program, DOS 5.1.

Although called DOS 5.1, this is really a DOS support program (since the DOS is already in the 1541). It is sometimes referred to as a wedge, because the way it works is by wedging itself between you and the BASIC interpreter. Effectively, it serves to add new disk commands to the standard BASIC.

Once it's loaded and initiated, you and your 1541 will get along much better. For example, you will be able to read the error channel simply by typing the symbol '>' and then RETURN.

The DOS Wedge also allows you to do

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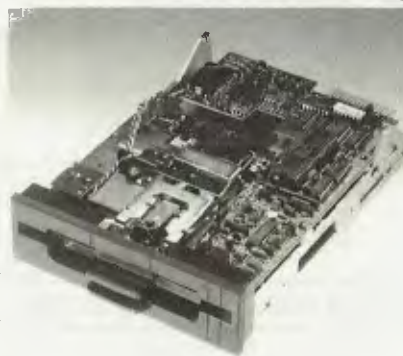
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lots of other useful things like initialise a new disk or scan the directory, without disturbing your BASIC program area. All the cumbersome OPEN and PRINT# statements are made redundant.

```
> = Read the error channel
/NAME = LOAD the program 'NAME'
↑ NAME = LOAD and RUN 'NAME'
%NAME = LOAD 'NAME',8,1 (i.e. absolute load)
-NAME = SAVE the current program
>S0:NAME = Scratch the file 'NAME' off the disk.
>I = Initialise Drive
>V = Validate a disk
>$ = Scan the disk directory
>$:NAM* = Display all files starting with 'NAM'
>N:NAME,ID = Format a disk
>N:NAME = Wipe and rename an already formatted disk
```

Note this last command is much faster than completely NEWing a disk, taking about five seconds compared to 90 the other way; this is because it clears only the BAM (block availability map). BAM contains the

pointers to the files on the disk and determines the remaining free space. If it is cleared the DOS will treat the disk as completely free. The BAM is written on only one track (track 18), which is why erasing it is the quickest way to wipe a disk. NEWing a disk not only clears the BAM, but also writes a new ID to every single block on the disk — hence the extra time involved.

To exit the DOS support type >Q; to restart it, SYS 52224.

It works in both DIRECT and RUN modes, allowing you to incorporate the easy wedge commands into your programs. To use it within a program you must enclose it in quotes; for example, > "0:\$" to read the directory. I use the wedge almost every time I sit down to work and I recommend you get to know it as well.

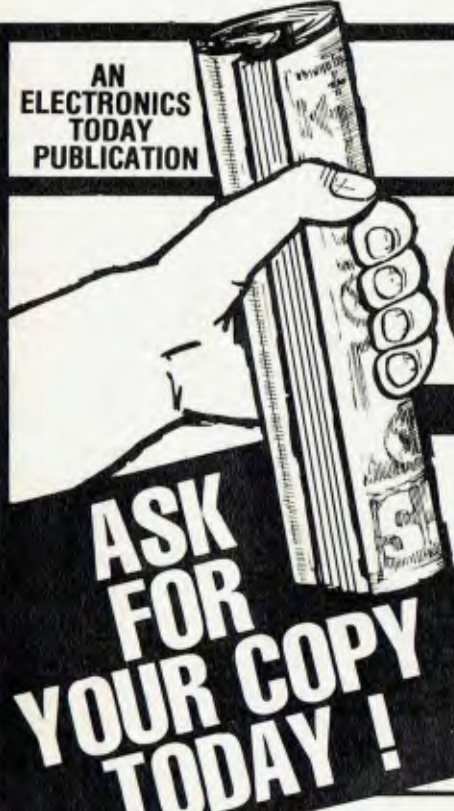
#### Small Disadvantage

The one drawback with the DOS wedge is that unless you have a monitor or some form of file transfer program, there is no easy way to copy the DOS 5.1 code to

another disk. It's easy enough to copy the boot part because that is in BASIC — just load it and save it to a new disk. But DOS 5.1 is an absolute-load machine language program, meant to be loaded into a specific part of memory high above the BASIC program space.

To get around this problem I have written a short program. To use it you must first have loaded the DOS wedge using the C64 Wedge boot program. You'll know if you've done this successfully when a message appears on the screen. Then load my Save-dos program, insert the initialised disk you want to copy the DOS onto, and type RUN. You should see the message 'SAVING DOS 5.1'. If you don't you've probably made a typing mistake, so check the code.

Don't forget to save the boot program C64 Wedge as well. If you save the boot as the first program on each disk, you'll be able to start each session with the command LOAD "\*",8 and then RUN. No need to remember names. ▶



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### Listing 1.

5 REM: DOSSAVER PROGRAM

10 I=49152

20 READ A: IF A=256 THEN SYS 49152: END

30 POKE I,A: I=I+1: GOTO 20

49152 DATA 169,8,170,160,255,32,186,255

49160 DATA 169,7,162,35,160,192,32,189

49168 DATA 255,169,0,133,251,169,204,133

49176 DATA 252,162,90,160,207,169,251,32

49184 DATA 216,255,96,68,79,83,32,53

49192 DATA 46,49,256

### Sprites and the 1541

These two things don't mix. When reading or saving data to disk, make sure you turn off any sprites you may be using. The additional hardware overhead of drawing the sprites seems to affect the accuracy of the system I/O. I haven't had problems saving data while sprites were enabled, but I may have just been lucky! Certainly it's perilous to attempt reading data, especially sequential files, with sprites enabled.

The sprite enable register is at location 53269. POKEing a zero there will turn them all off. If you want to be able to turn them on again afterwards, add something like A=PEEK(53269) and then POKE 53269,A.

### Backing Up Disks

As noted earlier, the BASIC load and save technique doesn't work with most machine language programs; there are several ways around this. The oldest is a Commodore public domain program called 1541 Backup, which will copy an entire

unprotected disk in around 20 minutes. There are other file transfer programs, some of which claim they will back up even protected disks. Copying protected disks is not something I want to dwell on; it's one thing to back up your own expensive software, something else to rip it off! If it's good enough to use, then it's good enough to pay for.

If you can't find 1541 Backup at your dealer, check out your local Commodore User Group. It will almost certainly also have other public domain programs capable of copying non-protected software. If not, contact either Commodore or SYDCOM (GPO Box 1542, Sydney 2001); SYDCOM has a disk utilities disk which is good value at \$15 (including postage). The SYDCOM disk also contains a modified version of the DOS with a help command, >H (lists the most common DOS instructions), and a colour command, >C (making it a snap to change border, background and text colours). □

# IBM UNDERGROUND

BY JOHN HEPWORTH

PC-WRITE is a word processor available through public domain channels on the basis that satisfied users send a contribution to the programmer. A printed and bound manual is sent to people who register ownership and submit \$75.

## The Bad News

The only really bad news, and then only for some users, is that PC-Write cannot handle textfiles over 60 Kbytes, regardless of the amount of RAM available. For machines with 64 Kbytes of total RAM, the limit is lower. I can live with this limit by dividing larger works into chapters, keeping each one as a separate file.

## The Good News

PC-Write is fast — all the text being worked on is in RAM, and the cursor moves around with lightning speed. However, unfortunately this is also the bad news, for being in RAM the text is subject to loss in the event of power failure unless regularly saved during a session!

PC-Write recognises DOS 2.xx sub-directories and can work on a file in any sub-directory on any available drive. If PC-Write is called up via a path, it can find all the help and other subsidiary files by looking through the same path.

## File Types

PC-Write creates straight ASCII files with a carriage return/linefeed at the end of each line. These files can be formatted or reformatted with or without justification, and with any line length. For printer control any character from a decimal 1 to a decimal 255 can be embedded in a file, including a decimal 27 <escape>.

## Block Operations

right and left margins, cut and paste, delete (with UNDO), wordwrap, insert and overwrite modes. Text to be moved, cut, copied and so on is shown in reverse video on my mono screen — much better than the Wordstar equivalent with dim and bright characters. PC-Write also has windows and can show different files in different windows.

PC-Write uses function key control for most operations. It's not mentioned in the manual, but if a user trained on Wordstar uses commands comprising the control key and a single second key, then PC-Write responds correctly. Control A, S, D, F, E, R, X, and C still move the cursor and page

around, even if Control C and R work upside down! Control G, T and Y delete characters, words and lines, and Control B re-formats.

Nine help screens are used, and with their aid the manual is almost redundant. No help screen is visible while entering text, but hitting the F1 key brings it up, and the other eight screens are then instantly available.

## The Printer

Dot commands are used to control the printer. Like Wordstar, these are a full stop (.) as the first character on a line, followed by the command to the printer. The actual commands are not identical to those used by Wordstar, but most functions are available on both.

The distribution disk has printer definition files for most printers, used to interpret the embedded codes within the files for each of the many available printers. Rename the one for your printer as Ruler.prt and installation is complete.

If more than one printer is used, don't rename: the print program will ask you for the filename. Anyone who has had to install two versions of Wordstar on one machine so that two incompatible printers can be used will immediately know just how useful this feature is.

## Spell Checking and Mail List

PC-Write does not include a spelling checker, and doesn't have a mailing list/merge function. I can't fix the first, but for the second I wrote a little program called Supermail, which you will find in Pocket Programs elsewhere in this issue. It isn't as powerful as Mailmerge, but is still very useful.

## Getting a Copy

PC-Write is copyright, but users are officially encouraged to make copies for friends. Most user groups will copy it onto a disk for \$10, as will Tomorrowland Computers in Sydney and Brisbane. My copy, and the manual, came from Tomorrowland.

## The Verdict

Is it any good? I've gone over to it as my word processing first choice, and only revert to Wordstar to reformat files for transmission to *Your Computer*. I've also registered my copy — and found the printed manual is really worth the fee. Definitely recommended. □

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## Software

### 64 Talk

Acme, (03) 596 6732

Price: \$79.95

Designed to work with Acme's Micromodem III, 64 Talk allows pages received from online databases to be stored in memory for later perusal, saving or printing. It's specifically aimed at Viatel users. The program's terminal mode allows you to set parameters required for communicating with the vast majority of databases.

### Acculink

NEC Information Systems, (02) 419 6199

Price: \$275 excl. tax

An asynchronous communications package which allows the NEC APC III to communicate with other computer systems in the standard asynchronous format. Menus assist new users through all sequences needed to establish communications, while a concise mode is available for advanced users. Provision is made for file transfer and conversation modes.

### Auto Router

Technical Imports, (02) 922 6833

Price: \$1740

Auto Router is a collection of software tools and circuit element templates which automates the task of routing traces on a double-sided PCB. The system accepts the net list description of the board, analyses the chaining of the circuit signals, routes the traces and produces an Autocad-compatible file which defines the parts layout and the routed traces. You need Autocad and an

MS-DOS system with 512 Kbytes of RAM to run Auto Router.

### CBA Accounting Systems

Intelligence, (02) 699 3877; (03) 690 6600

CBA is an accounting package suitable for small to medium business operations. It's compatible with MS-DOS, DOS 3.1, CP/M-86 and Xenix. The system is written in Dataflex and has an easy-to-use report generator and comprehensive aids for the operator. Modules may be purchased individually for \$795 (single-user), \$1150 (small multi-user) or \$1450 (large multi-user). Intelligence also offers package deals for those who purchase any five or any seven modules.

### Designing an Energy Efficient House

Prologic, (03) 429 3188

Price: \$60

Students can 'build' their own house using this simulation program. Parameters to be input include floor plan, types of walls, floors, windows, heating, insulation, ventilation, directional aspect and positioning of different types of trees. The house is then evaluated for its energy efficiency or for cost/energy efficiency ratio. Extensive graphics are used during the design process and the program produces a close-to-exact energy analysis. For Apple microcomputers.

### Developing Living Skills

Prologic, (03) 429 3188

Price: \$60

This simulation program guides the student through a year of living independently. While deci-

sions as to style of transport, accommodation and saving rate are within the student's control, most events are developed randomly. There's no winner — at the completion of the 'year' a summary is available to allow the student to discuss the outcome.

### Educational Databases

Prologic, (03) 429 3188

Price: \$55 each

What's In a Name?, Hounds and History, The Dream Machine and Crime and Society are four databases designed to introduce concepts involved in coding, classifying, counting and extracting information from databases. For students from years 4 to 11, each of the programs addresses a different set of data and introduces new concepts in data enquiry and retrieval techniques.

### Executive Software

Hewlett-Packard, (03) 895 2895

Price: Memomaker \$417,

Execudesk \$165

Executive Memomaker is an enhanced version of HP's Memomaker. Working in conjunction with HP's Graphics Gallery software, it can insert charts and graphics into letters, memos and reports. Included in the program is Memospeller, a spelling corrector with a 53,000-word dictionary. Execudesk acts as an environment to link HP-developed applications for the Touchscreen, providing rapid movement between programs and data sharing.

### Fantasy Isle and Take a Holiday

Prologic, (03) 429 3188

Price: \$55 each

These two programs assist in the development of creative writing skills for primary school children. Following a specially created story produced by the computer, the student names characters, adds incidents and twists of plot, and finally determines how the story will end. Once the story is written, the student can browse through it and change it if desired. A data bank of story ideas allows almost unlimited creation. Both programs run on Commodore, Apple, BBC and IBM.

### Graphics Gallery

Hewlett-Packard, (03) 895 2895

The Graphics Gallery programs have been developed by HP to run on the Touchscreen II. Charting Gallery produces pie, bar and line charts from numerical data, and Drawing Gallery allows users to create almost any type of presentation visuals and embellish visuals for reports. Charting Gallery takes data from programs such as Lotus 1-2-3. It costs \$451, while Drawing Gallery costs \$586.

### Maze School Administration software

Deloitte Haskins and Sells, (02) 221 2311; (09) 325 7044

Price: Modules from \$1000.

Maze handles timetabling and student administration needs for schools. Written for 16-bit microcomputers, the system is available in modules, so schools can set up a system according to their administration priorities and budgets. Maze can be networked to provide multi-user access. Most schools start with software costing about \$5000, and can build from there.

### Optionware

Sourceware, (02) 411 5711

Optionware is a library of application-specific software packages which run under Lotus 1-2-3 and cater to the corporate personal computer user. There are nearly 60 packages in the library and they cover financial statistics, sales and marketing, budgeting, personnel, asset management, and personal, private and financial organisation. A consistent user interface is maintained across the library. A minimum of 256 Kbytes of RAM and graphics capability is needed to run any of the packages.

### Public Domain Software for the Cromemco

Applied Environmetrics, (03) 80 2571

Price: \$37.50 per volume.

Because of the differences between CP/M and Cromemco's CDOS, and the special I/O of the C10, most public domain CP/M software can't be run on the C10. AE has produced three volumes of the 'best of' CP/M public domain software adapted to run on the C10. The volumes are Games, Communications and Utilities, and they include a version of Modem7, Undelete, file squeez-





ers and unsqueezers, clock setters and Adventure (550 point version). Volumes 5 (Assembler) and 6 (BASIC) are on the way.

#### **Logo for the Macintosh Developer** Microsoft, (02) 452 5088 Price: \$235

Written for users of all ages, this version of Logo is claimed to be the fastest, most advanced and most graphically powerful implementation of the language. The new version supports the full Macintosh interface with Turtle Graphics procedures and an extensible interpreter. Logo is compatible with the 128 Kbyte and 512 Kbyte Macs.

#### **QAD COBOL Application Developer** Softcode, (03) 529 8155 Price: \$3500

QAD incorporates a database and automated development support environment to generate COBOL programs which are flexible and versatile, without imposing restrictions on the user. QAD produces clear, modular, machine-independent code and can be used by novice or expert programmers. Softcode claims QAD can reduce development time by a minimum of 60 per cent, even in major applications. Features include a data dictionary, screen editor, query handler, application generator and report generator.

#### **Redliner**

Auto-trol Technology, (02) 923 2977  
Price: \$3500

Redliner is a Computer-Aided Design/Computer-Aided Manufacture (CAD/CAM) package for users of Auto-trol advanced graphics workstations. Redliner lets you examine both graphics and text and use the highlighting and text annotation features to indicate and describe required changes and updates. Any annotations are stored separately from the original drawings and can be displayed as a reference file over the original host workstation. All operations are menu-driven.

#### **Where Are We?**

Prologic, (03) 429 3188  
Price: \$55

In this simulation game for primary school children, the students build an environment (either imaginary or an area they know) and develop clues about eight particular locations. These are entered into the computer, then other students can guess the area using the clues.

#### **Woodland Foodwebs**

Prologic, (03) 429 3188  
Price: \$60

What would happen if wallabies ate eagles and a drought lasted for six years? Or if rabbits had not

been introduced into Australia? What native species are affected by foxes? These are some of the questions which can be explored using the Woodland Foodwebs program, which allows students to build a micro-world of animal relationships and then watch it over a simulated period of 15 years. Runs on the Apple II+, IIe and IIc.

#### **Sanyo Systems Solutions**

Sanyo Office Machines, (02) 929 4644  
Price: \$595

The 'SSS Pack' is a multi-user, multi-terminal accounting package designed to satisfy the needs of small to medium-sized businesses and accounting firms. In its most basic form the system can handle approximately 500 debtors and 1000 stock items. In the event of a power failure the 'automatic system restart' feature automatically returns to the last entry when power is restored.

#### **New Machines**

##### **Busicom 186**

H and H Busicom Systems, (02) 95 2983

Busicom is a new company. The 186 is a multi-user system providing support for 10 terminals from one Busicom unit, main memory from 0.5 Mbytes to 1.25 Mbytes, 'improved' CCP/M 3.3 operating system and hard disk storage from 20 to 200 Mbytes. A 10-terminal system with daisywheel printer costs under \$30,000.

##### **HP Touchscreen II and**

##### **Touchscreen Max II**

Hewlett-Packard

Price: From \$6138

Compatible with existing HP Touchscreen products, the Touchscreen II allows users to choose between a variety of mass storage options, ranging from a dual floppy disk system to a 20 Mbyte hard disk system with a single 9 cm microfloppy. The 20 Mbyte system (the Touchscreen Max) sells for \$12,078.

##### **Tandy 200 Portable**

Tandy Australia, (02) 675 1222  
Price: \$1399

The Tandy 200 features a 16-line by 40-character display and six built-in programs, including Mul-

tiplan. The other programs include a word processor, two management programs and a communications program. The 200 has 24 Kbytes of user memory expandable to 72 Kbytes. It also has an alarm clock and interfaces for a parallel printer, cassette and barcode reader. The computer is built around a CMOS 80C85 chip and can run for 16 hours on four AA batteries.

##### **Bondwell Model 2**

Bondwell International, (02) 818 4530

Price: \$2600

The Bondwell is a CP/M 2.2-based laptop machine. It has 64 Kbytes of user memory, an 80 by 25-line LCD display, one 9 cm disk drive with 360 Kbytes capacity and ports for connecting a printer, modem or second disk drive. Heaps of software is included in the price — there are Wordstar, Mailmerge, Datastar, Calcstar, Reportstar, Kermit (communications), scheduler and conversion tables. The documentation is extensive and highly readable.

#### **Peripherals and Extensions**

##### **Chauffeur Monochrome Card**

Roland, (03) 241 1254

Price: \$850

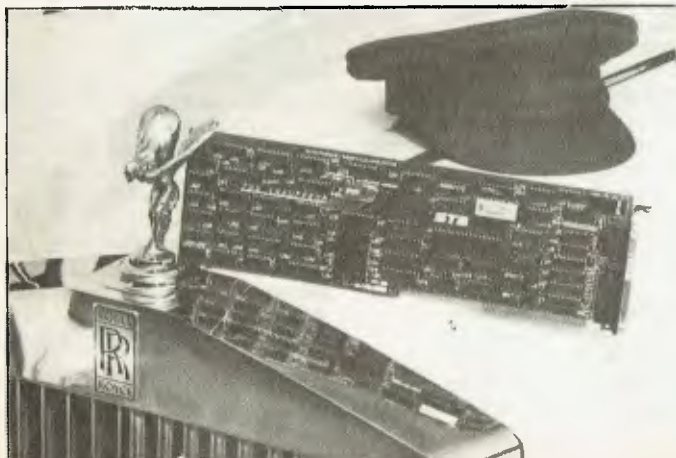
This IBM-compatible card displays colour graphics software in a full-screen format on a monochrome monitor, without the need for software modifications. It is claimed to work with any software compatible with the IBM PC and supports the high-resolution mode (640 by 400) being incorporated into new packages. The board requires one slot on the mother-board and has a parallel port compatible with the IBM graphics printer.

##### **NEC Monitors**

NEC Information Systems Australia, (02) 438 3544

Price: \$250 — \$1133 (excl. tax)

NEC has entered the monitor market with the release of four monitors, ranging from a 23 cm monochrome display to a 35.5 cm colour model. The monitors are designed for use with most makes of personal computers. The two colour monitors both feature a phosphor dot pitch of 31 mm, and





# NEW PRODUCTS

the 35.5 cm APC-H1311 model is the same as that used in the NEC APC III.

## **Qume QVT 101 and 109 Terminals**

STC, (02) 925 7272  
Price: \$795 and \$1295 respectively (excl. tax).  
These two new terminals provide tilt/swivel screens in green or amber; detached, low-profile keyboards with sculptured keys; a 7 by 9-dot character matrix with descenders, and six video attributes. The 109 has 38 user-programmable function keys.

## **Spinwriter Elf**

NEC Information Systems Australia, (02) 438 3544  
Price: \$795 (excl. tax)  
Another printer in the extensive NEC stable. The Elf is a 19 cps daisywheel with a 3 Kbyte buffer. It prints at 10, 12 and 15 pitch and proportional spacing. The Elf is compatible with NEC, Digital, Apple, Hewlett-Packard and IBM computers, among others.

## **Apple Communications Starter Pack**

NetComm, (02) 498 5577  
Price: \$895  
This Australian-developed package consists of a NetComm Apple In/Modem, a communications protocol card, Videotex II software and Async2 software — everything necessary to communicate with other computers. The In/Modem plugs into an expansion slot inside the computer and can communicate at 300, 1200 or 1200/75 baud in synchronous or asynchronous modes. Auto-answering and auto-dialling are supported.

## **Cambridge Computer Graphics PC1024**

Comprador Business Systems, (02) 681 4000  
Price: \$6000  
The PC1024 is a high-resolution graphics screen which Comprador is selling in conjunction with AutoCAD. Developed specifically for the IBM PC/XT, it provides rapid generation of graphics (vector pictures are drawn at 900,000 pixels per second) with a resolution of 1024 by 780 pixels. The screen is 50.8 cms with a monochrome display.



## **V2123PC Modem**

Data Sat, (02) 525 6688  
Price: \$595  
Another product with a catchy name. The V2123PC is designed to allow access to Telecom's Viatel network, and has in-built auto-answer circuitry. Software included with the modem allows the user to capture recovered information for later retrieval and processing, and an Information Provider option is available to allow frames to be created offline from either stored files or keyboard entry. An RS232 cable is required to connect the modem to the computer. A push-button phone is included in the package.

## **Services**

### **Archidata Database**

Visionhire, (02) 92 0902  
Price: \$3 — \$4.80 per hour  
Archidata is a database of architectural information. It has two levels of information — a public section and a restricted section. The public section has information on new products, a suppliers' index for those considering home improvement, information on careers in architecture, advice on common faults in houses and general

news. The restricted section is only accessible to those registered with the RAIA. It has professional and technical information, and an electronic bulletin board.

## **Furniture**

### **Adjustable Footrest**

Sylex, (02) 647 2888  
Price: \$55  
This footrest permits changes in both height and angle of slope. It is made from sturdy, powder-coated steel and topped in low-static, polypropylene carpet.

### **Anti-static Computer Mat**

Sylex, (02) 647 2888  
Price: \$289 for 1200 mm by 1500 mm mat  
The Sylex anti-static mats have a static decay of 5000 to 0 Volts in 0.3 seconds. They drain electricity by means of a conductivity lead with built-in 1 megaohm resistor, connected to an earthed point. The mats are transparent and available in three sizes.

### **Hydraulic Workstation**

Sylex, (02) 647 2888  
Price: \$995  
Designed to suit the weight and dimensions of bulk CAD/CAM

systems, the Sylex Hydraulic Table measures 900 mm by 1500 mm. The single, height-adjustable table top will fit two monitors, a keyboard, a tablet and a mouse. Height is adjustable from 570 mm to 720 mm.

## **Le Stand**

Sylex, (02) 647 2888  
Price: \$69 — \$89  
Le Stand is a vertical printer stand. It provides savings in desk space, and presents the printout directly in front of the user.

## **Taskmaster Workstation**

Sylex, (02) 647 2888  
Price: \$326 or \$425 with side printer stand.  
This workstation has two platforms (one for keyboard and one for monitor) which are both height-adjustable. The platforms also tilt forwards or backwards. The workstation has lockable front castors and is especially suitable for use with Balans chairs.

## **Miscellaneous**

### **Quick Cabler**

Datacraft, (03) 726 9911  
Price: \$228  
The Quick Cabler 20 helps you connect terminals, printers and other RS232 devices, and tells you how you did it. Three slide switches perform line-swapping functions under user control, with configuration changes made on pins 2, 3, 4, 5, 6, 8 and 20. Each swapping function performed is clearly labelled. A comprehensive manual comes with the Cabler.

### **Screenshooter CRT Photography Kit**

Polaroid, (02) 887 2333  
Price: \$240 excl. tax  
For those who want screen shots for presentations but can't afford the luxury of the Polaroid Palette system, Screenshooter provides hard copy with normal screen resolution. The kit comprises a rubber-cushioned CRT screen hood, a bracket for standard 35 mm SLR cameras (fitted with tripod mounts), a Polaroid OneStep 600 instant colour print camera plus bracket and a supplementary lens and extension tube to adjust camera lenses for CRT screen photography.

## A

**Accumulator:** The major register of a CPU, in which arithmetic and logical functions are performed. Some computers have several registers which can function as accumulators; in others, some registers can perform a subset of the full set of operations.

**Acoustic Coupler:** A device for connecting the telephone handset to data communications equipment.

**Address:** A memory location which can contain data or an instruction.

**AI:** Artificial Intelligence.

**Algol:** Algorithmic Language. An early computer programming language for mathematical applications. Widely used in Europe, it embodied early structured programming concepts and was a precursor of Pascal.

**Algorithm:** A set of instructions which define a method of obtaining some result (usually mathematical). A cooking recipe is an algorithm, as is a knitting pattern.

**Alphanumeric:** Composed of letters or numbers or both.

**Analogue (Analog):** Representation of a value by a voltage or some other measurable datum, rather than a binary or other representation based on counting.

**Application:** What you do with your computer. For example games, word processing and graphics.

**Array:** A set of values under a common variable name, accessed through a subscript. For example A[1] is the first item in array A, A[2] is the second, and so on. A[N] is the Nth item.

**ASCII:** American Standard Code for Information Interchange; a common system for representing character information.

**ASM:** Assembler. Also a suffix added to assembly language file names under CP/M to distinguish them from other files with the same name.

**Assembler:** A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.

**Assembly Language:** A language in which each machine code instruction is represented by a short mnemonic which is much

more comprehensible to the programmer. For example, the 8080 machine code instruction: 10010110 is: **SUBL**(subtract contents of register L from accumulator) in assembly language. Each line of assembly language becomes one machine instruction.

**Assign:** To make one thing equal to another; for example, [AB] assigns the value of B to A.

**Attribute:** A property possessed by some object, such as a file being read-only.

## B

**Background Task:** In a multi-programming environment, a low-priority program which runs when the processor has nothing else to do.

**Backup:** An extra copy of a disk, tape or file taken as a precaution against damage to the original.

**Bandwidth:** The range of frequencies that can be carried by a communications channel.

**Base:** The lowest number inexpressible as a single digit in a given number system.

**BASIC:** Beginners' All-purpose Symbolic Instruction Code. Invented in 1970 at Dartmouth College by Kemeny and Kurtz as a teaching language, it has since been enhanced in its more exotic forms into one of the most sophisticated yet easy-to-use languages available on personal computers. Its major rival is Pascal, which has the added virtue of stressing structured program design.

**Baud:** The number of bits transmitted per second along a data communications line.

**BCD:** Binary Coded Decimal, a 4-bit binary representation of the digits 0 through 9, with two BCD digits usually packed in a byte.

**BDOS:** Basic Disk Operating System. The major functional component of the CP/M DOS.

**Binary:** The base 2 system of counting used by digital computers.

**Binary Search:** A method of finding an entry in a table by successively halving the table until all that's left is the desired entry.

**Binary Tree:** A form of data structure in which entries are tagged on at the end of the appropriate branches.

**BIOS:** Basic Input/Output Sys-

tem. The part of the CP/M operating system which is different for each type of machine and provides any special I/O routines for disks, terminal, printer, and so on.

**Bit:** Binary digit, being the basic unit of data storage. Either 1 or 0, off or on, true or false.

**Block:** A physical division of data in a logical record.

**Boot:** To load the operating system into the computer from a disk or tape, either initially or subsequently after running a program.

**Bootstrap:** To use one short program to load a longer loader program which then loads the operating system.

**Branch Instruction:** A program instruction which causes the computer to jump to another instruction.

**Buffer:** An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

**Bug:** An error in a program. Makes programmers itch.

**Bus:** A set of wires over which data, addresses, or control signals are transferred between the central processor and memory or I/O devices.

**Byte:** A computer word eight bits wide. A byte in memory can hold a character or a binary number between zero and 255 (or -128 and 127), or a computer instruction.

## C

**C:** A programming language, developed at Bell Labs, which is particularly convenient for writing system utility programs.

**Call:** A jump to a subroutine which leaves the return address on the microprocessor stack, so when the subroutine is finished executing control returns to where it left off.

**CBASIC:** A commercial version of the BASIC language, running under the CP/M operating system. Doesn't use line numbers on every line, and is compiled, rather than interpreted like Microsoft BASIC.

**CCITT:** Consultative Committee on International Telegraphy and Telephony. The committee sets standards for various aspects of telephone and telegraph usage.

**CCP:** Console Command Proces-

sor. The part of the CP/M operating system that reads a command line and sorts out what it means.

**Chain:** To automatically run one program after another.

**Character:** A letter or number, or in some circumstances a control code such as 'carriage return'.

**Checksum:** A running total of the characters in a file, recorded or transmitted with the file so that errors can be detected.

**COBOL:** Common Business Oriented Language; a high-level language, mainly used in business applications.

**Code:**

**Absolute:** Machine instructions which are intended to be loaded and executed in a particular area of memory.

**Object:** Machine instructions, as distinct from the source code from which it was generated.

**Re-entrant:** Code which may be called by more than one program at a time.

**Relocatable:** Code which can be loaded and run anywhere in the computer's memory.

**Source code:** A program written in assembly language, or a high-level language such as BASIC, which must then be assembled or compiled to produce the object code which can actually be executed.

**Cold Boot:** To start up a system from scratch, loading the operating system from disk or tape.

**Cold Start:** See Cold Boot.

**COM File:** In CP/M parlance, a command file; that is, a machine code program that can actually be run.

**Command:** An instruction from the console for the system to do something.

**Comment:** A note added into a program to help the reader (or programmer) to understand its operation. Does not affect the program's execution in any way.

**Compiler:** A program which accepts as input a source file written in a high-level language, and produces as output an object file containing the machine instructions which are actually executed.

**Concatenate:** To join two strings together, one after the other.

**Conditional:** A test; for example, is X greater than Y:

IF X > Y THEN GOSUB 500 (BASIC)



# GLOSSARY

Conditionals are one of the most powerful features of any computer language.

**Configure:** To organise the I/O or other aspects of a system.

**Console:** The keyboard and screen from which the operator controls the computer.

**Control Characters:** Codes which perform functions like acknowledging correct receipt of a message or requesting retransmission of an erroneous message. Control characters are defined as part of the ASCII and similar codes.

**CP/M:** A disk operating system for 8080- and Z80-based microcomputers. Allows the user to store information and programs in named files, as well as managing disk storage and input/output functions. Other disk operating systems include TRSDOS (on TRS-80), DOS 3.3 (for Apple) and MSDOS on many 16-bit micros.

**CPS:** Characters Per Second.

**CPU:** Central Processing Unit. The part of the computer responsible for fetching, decoding and performing instructions.

**Crash:** A situation where the system becomes inoperative, due to a hardware or software error.

**CRT:** Cathode Ray Tube. Usually refers to the screen of a video terminal.

## D

**Daisywheel Printer:** A high-quality printer which has a print-head in the shape of a daisy.

**Data:** Information to be processed by, or output from, a program.

**DBMS:** Data Base Management System. A program which manages the systematic storage and retrieval of a centralised data pool.

**DDT:** Dynamic Debugging Tool. A program that assists the user to find errors in machine code programs.

**Debug:** To locate and fix errors.

**Decimal:** Based on ten.

**Device:** A piece of equipment such as a printer or tape drive which the computer uses.

**Directory:** A list of the programs on a disk (or occasionally tape) together with necessary information, such as length and location.

**Disk:** A flat, circular magnetic surface on which the computer can store and retrieve data and

programs. Is fast compared with tape, particularly when information is not stored sequentially.

**Disk Drive:** The mechanical assembly which rotates the disk and positions the read/write head.

**DOS:** Disk Operating System.

**Disk Operating System:** A program which operates one or more disk drives automatically and manages the system.

**Display:** The computer's output device at the console, usually a TV-like display of letters and numbers; sometimes the computer can produce graphics (charts and pictures) on the display.

**Distributed System:** A system in which information is stored in several computers; peripherals may be shared, but the information storage is decentralised.

**Dot Matrix Printer:** A printer which creates a text image from a cluster of dots; produces relatively low-quality, high-speed text and graphic output.

**Double Density:** A method of recording twice as much information on a floppy disk, requiring a higher-quality recording surface than on a single-density disk.

**Driver:** A program which controls input and output to a device.

## E

**EBCDIC:** Extended Binary Coded Decimal Interchange Code; an 8-bit character coding system — IBM's answer to ASCII.

**ED:** An editor program; part of CP/M.

**Editor:** A program which lets you alter and correct source files and other documents.

**Error Message:** Tells you something went wrong, and sometimes what.

**Execute:** To run a program; to follow its instructions.

## F

**FIFO:** First in, first out. A technique used in memory management procedures, or a device used in buffering data flow between two asynchronous devices operating at different speeds.

**File:** A continuous collection of characters (or bytes) saved on a disk or tape for later reloading.

**Fixed Point:** Counting in integers

only. Usually limited to small values, and restricted in accuracy, giving rise to ridiculous answers such as 9/5 1.

**Flag:** A variable, sometimes a single bit, which can have only two values and is used to indicate some condition.

**Floating Point:** The kind of arithmetic used in scientific calculators.

**Floppy Disk:** A disk, made of thin, flexible mylar, and enclosed in a card jacket, which can be used for magnetic storage. There are three varieties, 9 cm, 13 cm and 20 cm. These can typically store somewhere between 140,000 and three million bytes (characters).

**Flowchart:** Symbolic representation of the sequence of instructions in a program.

**Focal:** Formula Calculator. A simple language rather like a small BASIC, found on some mini and microcomputers.

**FORTRAN:** Formula Translator. One of the first computer languages, and beginning to show it, although still the king of the scientific or number crunching languages.

**Function:** A sub-program that processes variables in some well-defined way.

## G

**Garbage Collection:** The process of going through memory or disk space, reclaiming all the redundant unused space.

**Gigabyte:** One thousand megabytes (1,024,000,000 bytes).

**Glitch:** A pulse of electronic 'noise' which may cause a system failure.

**Global:** A variable which is known to all the parts of a program. See local.

## H

**Handshaking:** A technique for controlling data communication between two devices; data flow only occurs when the receiving device sends a signal indicating it is ready to receive.

**Hard Disk:** A disk made of hard material, which is larger, faster and more fragile than a floppy disk, but capable of storing 70 million bytes or more.

**Hard Copy:** Printout.

**Hardware:** The bits of a com-

puter you can kick, as opposed to the programs you can only swear at.

**Hashing:** A method of reducing the size of a table which otherwise would have mostly empty entries.

**Hexadecimal:** The method of counting to the base sixteen or the method of splitting binary digits into groups of four, which is the same thing. In hex, you count: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22.

## I

**IC:** Integrated Circuit.

**Identifier:** A label, or the name of a variable.

**Index:** A variable which usually points to an entry in a table or list.

**Index Register:** A processor register which is used to access tables and lists in memory.

**Indirect Addressing:** Referring to a variable which actually contains the address of another variable.

**Inkjet Printer:** A device which prints by electrostatically aiming a jet of ink onto the paper.

**Input:** To get data into the computer.

**Instruction:** A step the computer can perform.

**Instruction Set:** The range of commands which can be performed by a particular processor.

**Integer:** A whole number.

**Integrated Circuit:** A circuit built on a single chip of silicon.

**Interface:** The (hardware or software) connection between any two devices.

**Intermediate Code:** A special kind of object code which cannot be run directly on the computer, but must be interpreted.

**Interpreter:** A program which examines source code a line at a time, decides what it means, and then does it. Compare with compiler.

**Interrupt:** To electronically drag the computer away from what it is doing in order to respond to some time-critical situation.

**I/O:** Input/Output.

**I/O-bound:** A process in which the performance speed is limited by the speed of input/output.

**J**  
**Jump Instruction:** Normally, control proceeds from one instruction to the next, one after the other. A jump instruction passes control, not to the following instruction, but to some other. Jumps can be conditional.

**K**  
**Kilo-:** Prefix meaning one thousand.  
**Kilobyte:** 1024 bytes (Kbyte).  
**Kilobaud:** 1000 baud (Kbaud).

**L**  
**Label:** A word which identifies the destination of a call or jump instruction, or simply identifies some location in memory.

**LAN:** Local Area Network.

**Language:** The set of instructions, and rules for stringing them together, which you use to instruct the computer what to do.

**Laser Printer:** A printer which works a bit like a photocopier, but uses a laser to draw an image directly onto the printing drum.

**LCD:** Liquid Crystal Display.

**Library:** A set of programs, or sub-programs, that can be called from your program so you don't have to waste space with a block of commonly used code; for example, a date routine can be held in a library.

**LIFO:** Last In, First Out. A device or data structure in which the most recent item stored is the first available for retrieval. A stack is a LIFO.

**Line Number:** A number at the beginning of a line, which identifies it in a similar way to a label.

**Line Printer:** A high-speed printer for computer output.

**Link:** Part of a data item in a list, which tells the computer the location of the next data item.

**LISP:** List Processor. A language much favoured by the artificial intelligence community.

**List:** A sequence of consecutive data items.

**Load:** To transfer some data or program into the computer memory.

**Locate:** To 'fix' a relocatable code so it will only run if loaded in a particular location.

**Local Area Network:** A system of

interconnected computers, within a limited geographical space (usually in a single building).

**Logical Device:** A device as the computer 'sees' it: what the computer regards as the 'list device' may be one of several 'physical devices', such as a line printer or teletype.

**Loop:** To repeatedly execute a sequence of instructions; part of a computer program that is so executed.

**M**  
**Machine Language:** The binary codes the machine actually executes.

**Macro:** A user-defined sequence of instructions which can be inserted anywhere in a program. See Library.

**Macro-assembler:** An assembler which can utilise macros.

**MBASIC:** Microsoft BASIC, the BASIC used in the TRS-80, PET, Apple II and so on.

**Megabyte:** One thousand kilobytes — 1,024,000 bytes (Mbyte).

**Memory:** Where the computer stores data and programs internally for fast access.

**Menu:** A display which offers the operator a choice of alternatives.

**Microcomputer:** A small computer based on a microprocessor.

**Micro-floppy:** A 9 cm 'floppy' disk, produced with a rigid plastic case.

**Microprocessor:** The central processing unit of a computer, built into a single silicon chip.

**Millisecond:** One thousandth of a second.

**Mini-diskette:** A 13 cm floppy disk.

**MIPS:** Million Instructions Per Second. A measure of processor speed.

**Modem:** Modulator/Demodulator. Device used to link a computer to the telephone line. It encodes digital bits into frequencies, and vice-versa.

**MOS:** Metal Oxide Semiconductor. Technology used for manufacturing high-density semiconductors. CMOS (complementary MOS) technology is characterised by low energy consumption, and is increasingly used in portable computers.

**Mouse:** A device connected to a computer which, when moved around on a desk, moves a pointer on the computer screen.

**MP/M:** A multi-user version of

CP/M.

**Multiplexer:** Device used to divide a communications line among a number of users.

**N**  
**Nanosecond:** One billionth (.000000001) of a second.

**Nibble:** Half a byte (4 bits).

**Node:** A connection point on a network.

**Network:** A system of interconnected computers.

**O**  
**Object Code:** Machine code.  
**Object File:** A file containing object code.

**Object Module:** An object file containing part of a program, ready to be linked to others.

**Octal:** The system of counting to base eight, or grouping bits in threes.

**Offset:** To give the operating system the characteristics of a file so that it can subsequently read or write it.

**Operand:** The number an operator (+, -, and so on) operates on.

**Operator:** An arithmetic function or some other function which alters variables.

**Optic Fibres:** Cables made from thin fibres of glass (or similar material). Signals are encoded as light and transmitted along the cables.

**Optimisation:** Making a program work better (or faster, or using less memory).

**Output:** What the system produces.

**Overlay:** A technique for efficient use of memory space, in which different routines use the same memory locations. Routines using the same area are held in a backup store, and transferred into memory when needed.

**P**  
**Packed Data:** Data which shares the same address, and has to be unpacked before use.

**Packet Switching:** A system of communicating data by dividing it into small packets addressed to particular receivers.

**Page:** A length of memory, typically 256 bytes.

**Parallel Transmission:** A method of moving data so that all elements of a compound unit are sent simultaneously. For exam-

ple, the eight bits in a byte may be sent at the same time by using eight channels. This is the method used within the computer, and with some printers. Fast and expensive.

**Parameter:** A constant which sometimes has to be varied.

**Parity:** An extra bit on the end of a character or byte for error detection.

**Pascal:** A modern structured language which may eventually rival BASIC in popularity for microcomputers.

**Password:** A secret word the system may demand of you before allowing you access to certain (or all) programs or data.

**Patch:** A temporary (ha, ha) fix on a bug.

**Peripheral:** A piece of equipment the computer uses, like a printer, disk drive, or modem.

**Physical Device:** See Logical Device.

**Picosecond:** One trillionth (.000000000001) of a second.

**PIP:** Peripheral Interchange Program. A CP/M utility for copying files between devices.

**PL/I:** Programming Language One. A good general purpose commercial language.

**Pointer:** A variable used for indirect addressing.

**Polish Notation:** A method of separating operators and operands; for example, + 5 4 is Polish notation for 4 + 5.

**Poll:** To ask a peripheral if it requires service. For example, a processor will regularly check a terminal to see if it has output ready to be processed.

**Port:** A physical input/output connection point.

**Postfix Notation:** Also known as Reverse Polish Notation, this is similar to Polish; + 4 5 means 4 + 5.

**Preprocessor:** A program which does part of a job to make life easier for the program which follows; for example, a macro processor before an assembler.

**Priority:** The resolution of which interrupt is serviced first if two should arrive at the same time.

**Process:** A program.

**Processor-bound:** A process in which the limiting performance factor is the speed at which the processor can perform the required computations.

**Program:** A sequence of instructions which can be understood ▶



# GLOSSARY

and ultimately followed by a computer.

**Prompt:** A message asking the operator or user to supply information.

**Protocol:** The rules governing the exchange of information between two devices.

## Q

**Queue:** A list in which entries are made at one end, and removed from the other.

## R

**R/O:** Read Only; cannot be overwritten.

**RAM:** Random Access Memory.  
**Random Access Memory:** The computer's internal memory, which is used to hold running programs and data. The computer can write and read RAM.

**ROM:** Read Only Memory.  
**Read Only Memory:** Internal computer memory used to store programs, which cannot be erased or overwritten.

**Reader:** Paper tape input device.  
**Read/Write Head:** The small coil which reads and writes on the surface of a disk.

**Real-time:** A system in which the processing of data input to the computer takes place virtually simultaneously with the actions which generate the data.

**Record:** A set of related data items. For example, an employee's name, address, payroll number and pay rate.

**Recursion:** The ability of functions in some languages to call themselves.

**Re-entrant Code:** Code which can be used by several programs simultaneously, keeping separate data for each.

**Register:** A location in the processor capable of performing logical or arithmetic functions on the contents.

**Relocatable:** Capable of being moved in memory.

**Relocatable Object Module:** Part of a larger program consisting of many such modules, all linked together and located.

**Resident:** Permanently in the system.

**Reverse Polish Notation:** See Postfix.

**RS232:** (also RS232C) Registered Standard 232C. A widely used standard for connecting com-

ponents in a computer system.  
**Run:** To execute a program.

## S

**SI00:** A popular 100-line micro-computer bus, originally developed for the first 8080-based computer.

**Save:** To store a program on disk or cassette (particularly BASIC).

**Screen:** See CRT.

**Sector:** A section of data on a disk.

**Serial Transmission:** Movement of data one bit at a time. One byte will be sent as eight bits, one following the other. Cheap and slow.

**Simulation:** Making one system behave like another.

**Software:** Programs.

**Source Code:** The original text form of a program.

**Source File:** A file of source code.

**Source Language:** The language the source code is written in; for example, BASIC, Assembler, C.

**Sort:** To arrange items of data in order.

**Spool:** Simultaneous Peripheral Operations Online. A method of outputting information by queuing information for low-speed output devices, while simultaneously continuing other computer operations.

**Stack:** A list in which both entries and removals are made at the same end. A microprocessor usually has a hardware stack which is used to save subroutine return addresses, for temporary storage of data, and to pass variables between subroutines.

**String:** A sequence of characters.  
**Submit:** To put the system under control of a file of system commands.

**Subroutine:** Part of a program which can be accessed from several points within the program.

**Symbol:** The name of a variable or a location in memory.

**Symbol Table:** A table constructed by an assembler or compiler to give the addresses of all variables and labels in a program.

**System:** A collection of hardware and software, possessed of the property that the whole is greater than the sum of the parts.

**System Disk:** A disk carrying the operating system.

## T

**Teletype:** An electro-mechanical printer/keyboard.

**Terabyte:** One thousand giga bytes (1,024,000,000,000 bytes).

**Timeshare:** Running several programs on a system simultaneously.

**Track:** The area under the read/write head during one rotation of a disk.

**Transient:** A program that is only in memory for a short time before being overwritten. Often, the only program that is not a transient is the operating system.

**Tree:** A list in which each data item may refer to several others.

**TTY:** See Teletype.

## U

**UART:** Universal Asynchronous Receiver/Transmitter. A device which handles the serial-to-parallel and parallel-to-serial conversion of bits in a data message.

**Unix:** A multi-user, multi-tasking, multi-programming operating system.

**Utility:** A program of use to most users.

## V

**Variable:** Named quantity that can take on different values.

**VDT:** Video Display Terminal.

**VDU:** Video Display Unit.

**Verify:** To check that data written on a disk or tape can be read again correctly.

**Viatel:** Telecom Australia's videotext system.

**Videotext:** Also known as viewdata. A technology which uses slightly modified domestic televisions to access data from a computer database along the telephone lines. Prestel in the UK was the first such system. Australia's version is called Viatel.

**Virtual Memory:** A technique allowing programs larger than RAM to run. Only part is in memory. Parts are swapped from an online storage device as required.

## W

**Warm Boot:** To reload the operating system a second or subsequent time.

**Window:** A part of a computer screen which has been divided into sections for displaying distinct information. On some systems which run a number of processes at once, each concurrent process may be displayed in its own window.

**Word:** The amount of data fetched from one memory location. Typically one byte, but can be two on recent processors.

**Word Processor:** A system for manipulating, editing, printing and formatting text files.

**WordStar:** A proprietary word processing program.

**Word Wrap:** A word processing function which automatically breaks lines exceeding the set right margin limit, and begins placing the words on the next line.

**Write Protect:** To remove the cover from the notch in a 20 cm floppy disk, so it cannot be written on. With 13 cm mini-floppies, the reverse action (that is, covering the notch) will write-protect the disk.

## Z

**Z80:** A popular 8-bit micro-processor.





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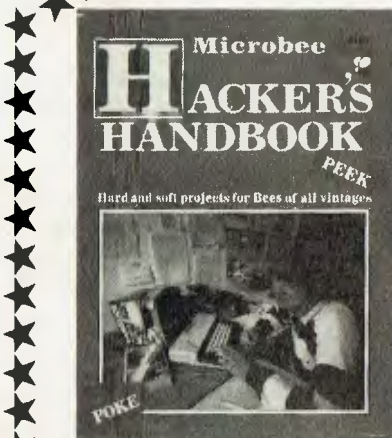
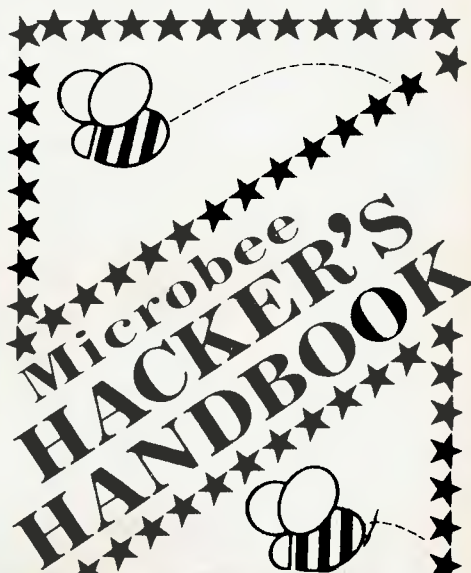
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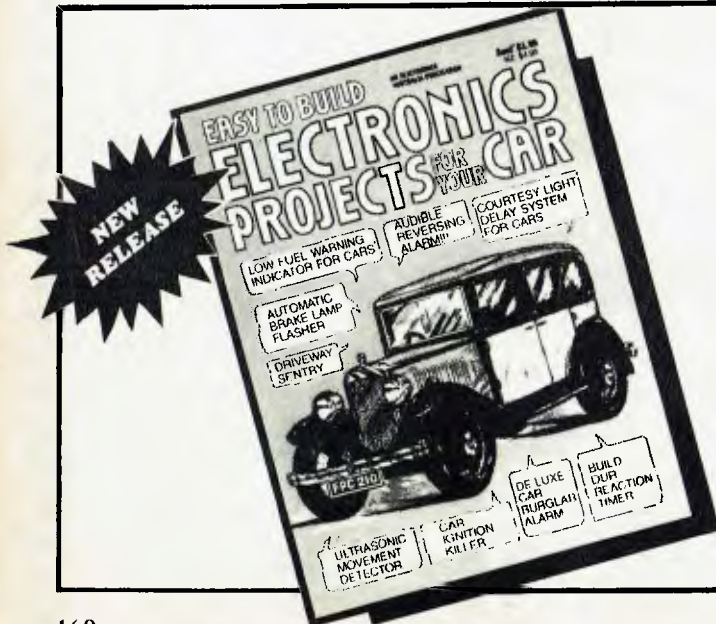
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Contributions to *Your Computer* are welcomed and will be given every consideration\*. Please read these notes carefully to get an idea of the style and format we prefer.

All **Contributions**: should include your name, address, and home and office phone

numbers (in case we need to check details). Each page of your submission, and any material sent with it, should also carry your name.

**Contributions by Telephone:** Contributors who have modems and suitable software (in the MODEM7/YAM mould – see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our computers through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

**Contributions on Disk:** Contributions can be accepted in a wide variety of disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks. We can also handle, in-office, Kaypro II and Osborne 13 cm disks, and 13 cm Apple DOS or Apple CP/M disks. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

**Listings:** Unless it is absolutely impossible, we want listings produced on the computer. This reduces the risk of error – if the computer typed it, the computer probably accepted it. Print listings with a dark – preferably new – ribbon on white paper, and try to format the output to a narrow (40-characters) width. If they can't be produced on a printer, borrow a good typewriter – hand-written material is likely to sit around the office for a year before someone can find time to type it all out for you! Please provide an account of what the program does, how it works and so on. Any comments on the program should refer to the address, line number or label rather than to a page number. Any comments on modifying the program to work on other machines will be appreciated. Try to include a printout of at least part of a sample run if possible.

**Style:** All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies – no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum.

\*Although the greatest care will be exercised with contributions, no responsibility can be accepted for the safety or return of any letters, manuscripts, photographs or other materials supplied to *Your Computer* magazine. If return is desired, you should include a stamped, self-addressed envelope. If return is critical – say it's something you can't afford to lose – then don't send it; we are careful, but we're not perfect. □

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# your computer

## DO WHAT YOURSELF?

So, there you are, surgical gloves on, Philips-head screwdriver in hand, assistant standing by with a clean kitchen towel around the waist — you're all ready to 'do it yourself'. Well, let's put that one down to experience, shall we? We have very good reasons for never promising nuffin' — it lets us be flexible without feeling guilty.

For those of you who are feeling a bit lost, we had intended to give the October issue of *Your Computer* a do-it-yourself theme, but those articles have been pushed forward to November in order to make room for something much more urgent — communications.

Over the past month or two, more than half the reader's enquiries received by *Your Computer* have been related to communications. "What kind of modem should I buy?", "Where can I find communications software to suit my machine?", "How do I actually get onto The Source, and what will it cost?", "I can't get very far with the *Your Computer* bulletin board, do I have to be a member or something?" — these are some of the more common queries

lobbing on our desks and gurgling uncertainly down the phone lines.

It's hardly surprising to see such a surge of interest in computer communications. The establishment of Viatel and its related services, in particular, has given comms a more approachable identity. Business people are being urged to attend a fresh round of seminars covering the importance of data communications to their companies; modems are becoming cheaper and more reliable; a new user group bulletin board comes into action almost every week. Overseas data services are becoming better known as sources of information, and several new local databases have also been announced.

There's plenty to write about and obviously lots to explain, given the diversity of machines people are using to access all these facilities and the computer industry's tendency to provide inadequate documentation, particularly for beginners.

## NO PERSON IS AN ISLAND

... But if you are, you need data communications. *Your Computer's* October issue will kick off with a new *Hitchhiker's Guide* to the datacomms galaxy, in which Bill Bolton will take you on a tour of the telephone network and all the facilities now available, from PAMS systems far and wide to the Source in the United States, with Viatel, Teledata, Compuserve and lots more in between.

Our resident comms novice will dial bravely into the above network, stumbling over concealed passwords, becoming entangled in clusters of wires, being harassed by bauds and shrilled at by carriers, in order to chart a safe course (in an article entitled *Gosh!*) for those who may follow.

Bill Bolton, who somehow foresaw the communications crisis of unknowing users, has secretly been testing and reviewing some of the latest modems for just such an issue as this. In order to review modems, you have to use them to communicate with something. While going about his task Bill discovered a few things about the kind of data communications networks becoming available to Australians. In *What's in the Packet?* he gives us the good and bad news about sending binary data over digital data packet-switching networks.

Rose Vines, the newly initiated sysop of the *Your Computer* bulletin board, will offer a candid (hysterical?) view of what it's like trying to maintain the service, answer queries and generally please everybody at the same time.

Under 'maybe-this-month-but-if-not-then-sometime-soon'

we're tentatively suggesting we may run a listing, compiled from user group sources (provided they're willing to consider co-operating), of the various modems known to work with particular computers, and also the most commonly used comms programs for each machine ... we think.

On a more definite note, we will be publishing more than our usual quota of reviews in October. Among the machines to come under scrutiny are the Tandy 1000 and the Toshiba 1500. On the soft side, we've got Assure, a package for insurance agents, which keeps track of client information, superannuation details, and so on; Rbase, the next (long-awaited) suspect in *The Great Database Search*; Wordstar 2000; the Zardax Word Processor II for Apple users; and a comparative look at the merits of Microsoft BASIC and Macpascal.

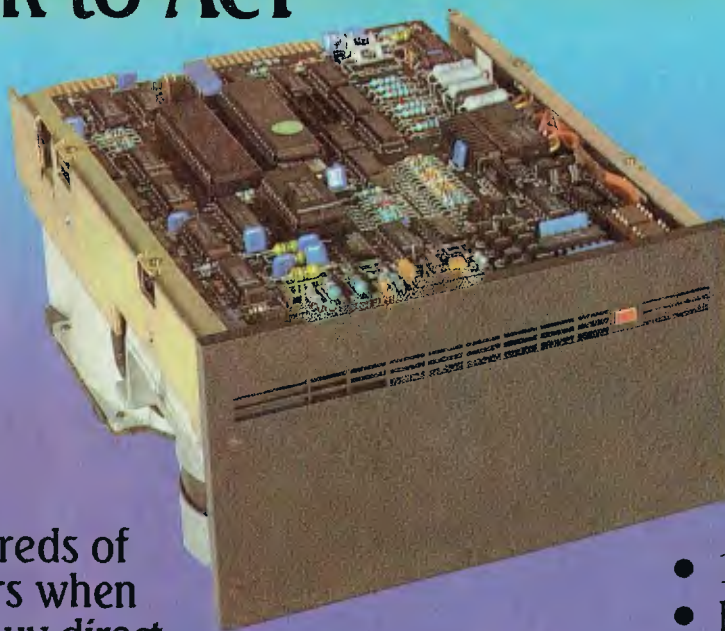
We also have what one might call an exotic in October's review section; it's the Omni-Reader, an optical character recognition device. Haven't you always dreamed of a machine that would 'read' from printed material directly into your computer? The Omni-Reader is a step in the right direction.

Always taking care of business, Norman Kemp is working on an informative article explaining how pharmacies are putting computers to good use ... And, if you have any energy left after all that, you can still do a bit yourselves with the help of *Structured Programming*, *PCs in Marketing* and *Pocket Programs*.



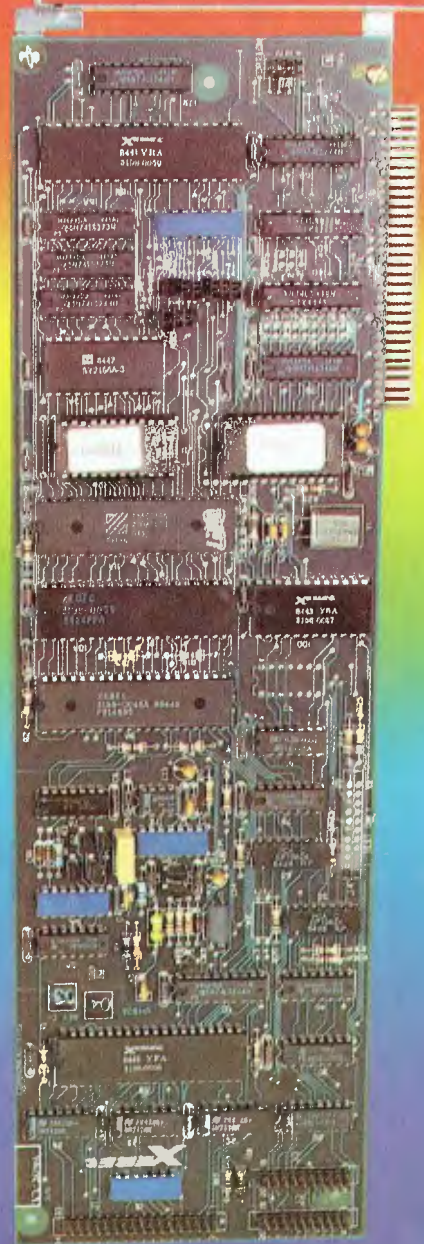
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